Chemical Week

March 30, 1957

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How 28 companies will raise $1.2 billion for their '57 expansions . . . . . pg. 16

Old researcher's advice: Bring your research lab back to the plant . . . . . p. 48

Sulfuric acid consumption shows steady growth, but production capacity grows even faster . p. 64

Two new uranium extraction methods are about to get semi-works production tryouts . p. 73

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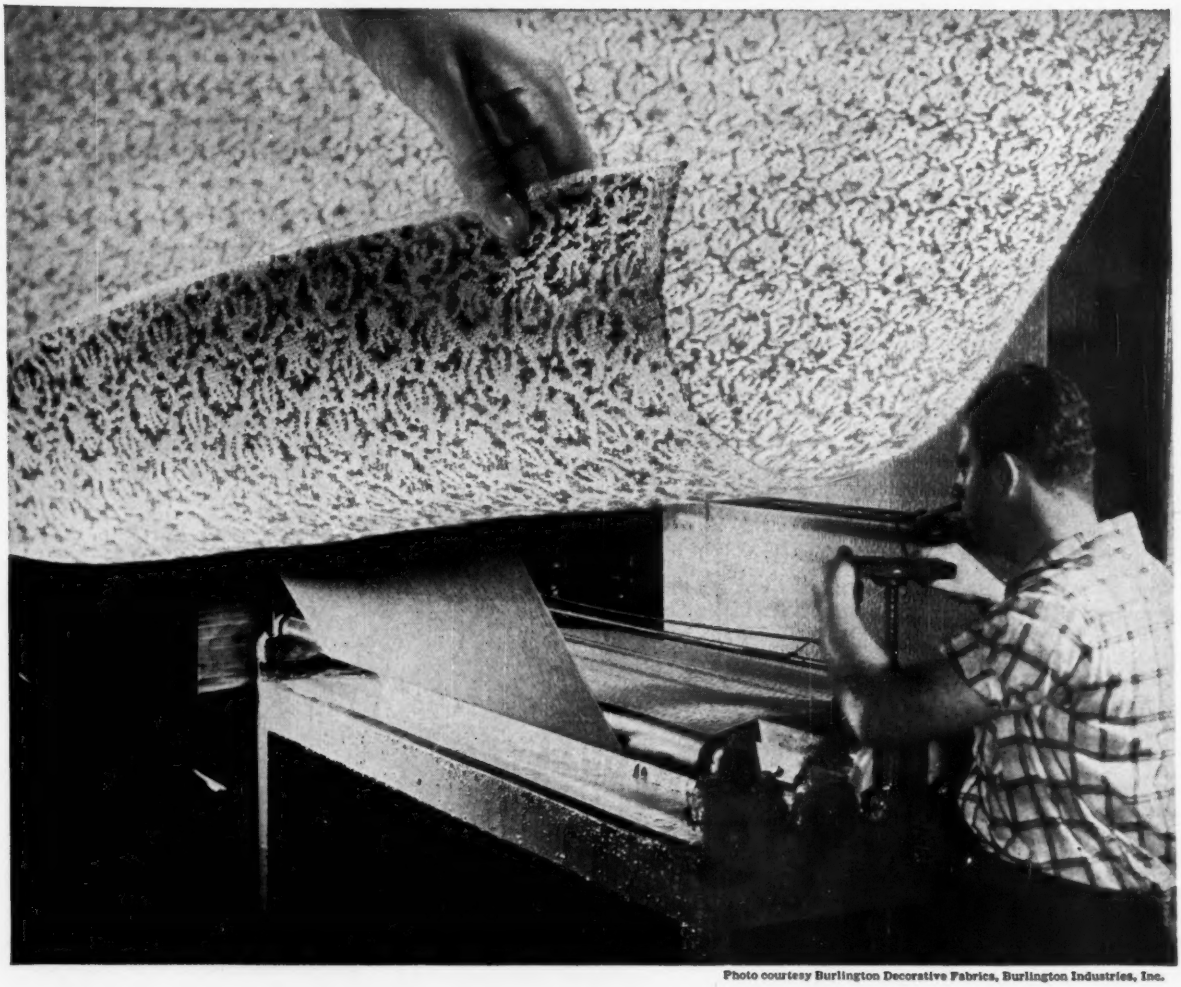

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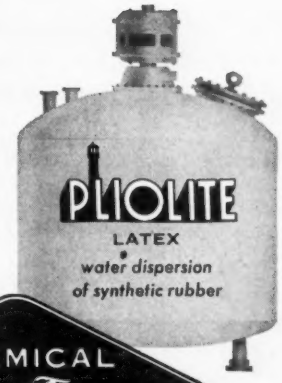

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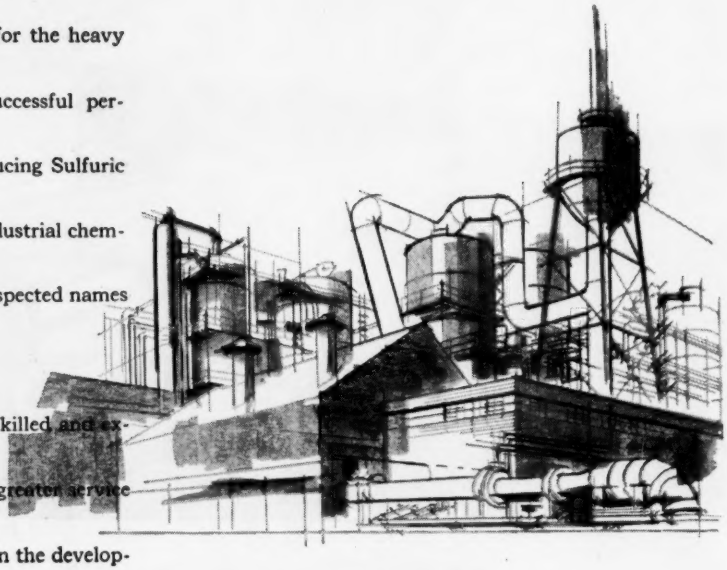

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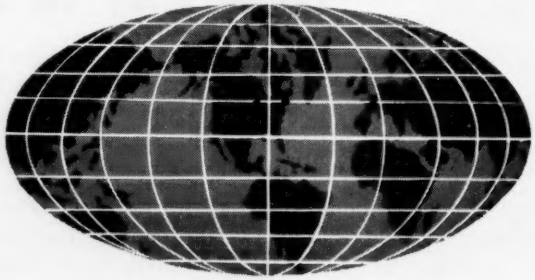

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Chemical Week

Vol. 80, No. 13

TOP OF THE WEEK

March 30, 1957

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- **There's a new market ahead for pesticide makers,** as government clears use on new range of agricultural products p. 43
- **. . . but ag chemicals are in trouble,** if new figures give accurate reflection of the industry's profitability .....p. 44
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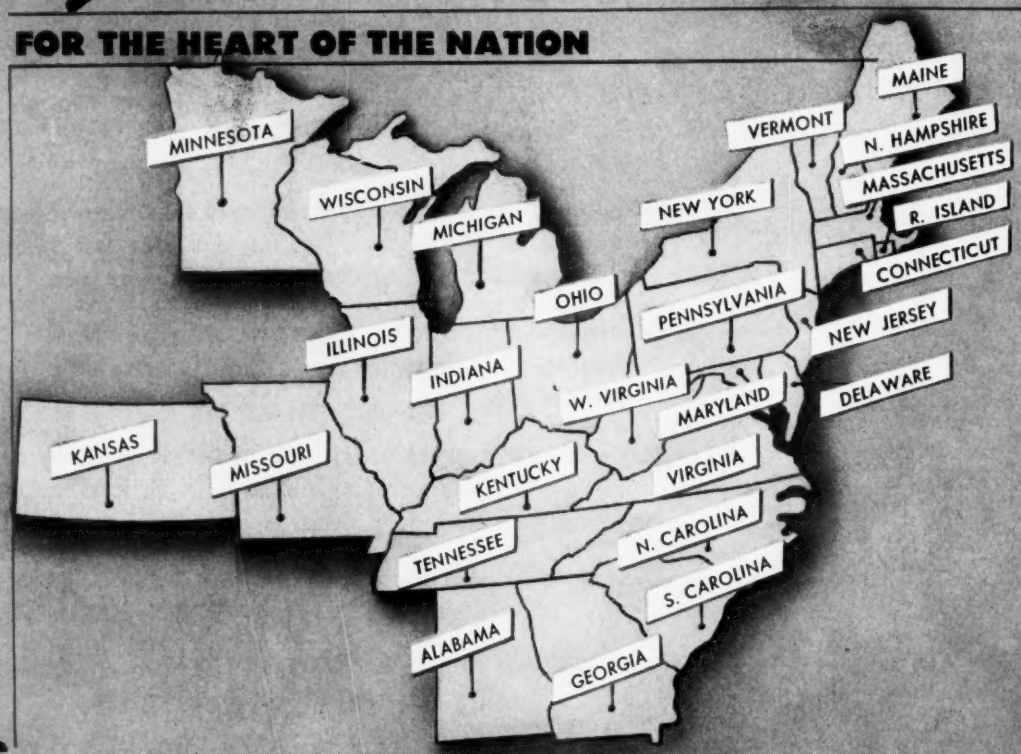
Liquid Transportation

FOR THE HEART OF THE NATION



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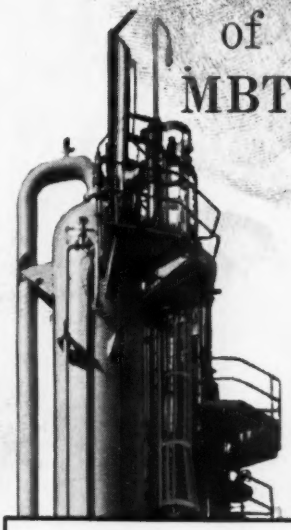

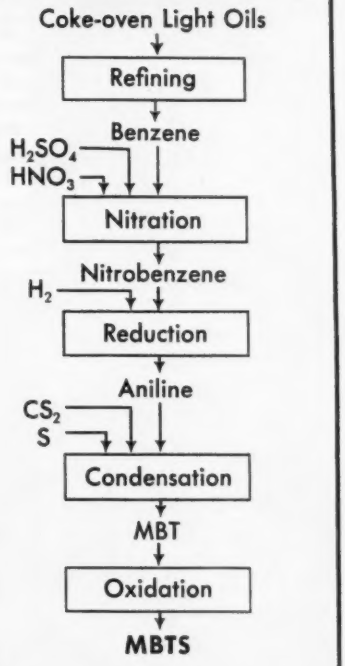

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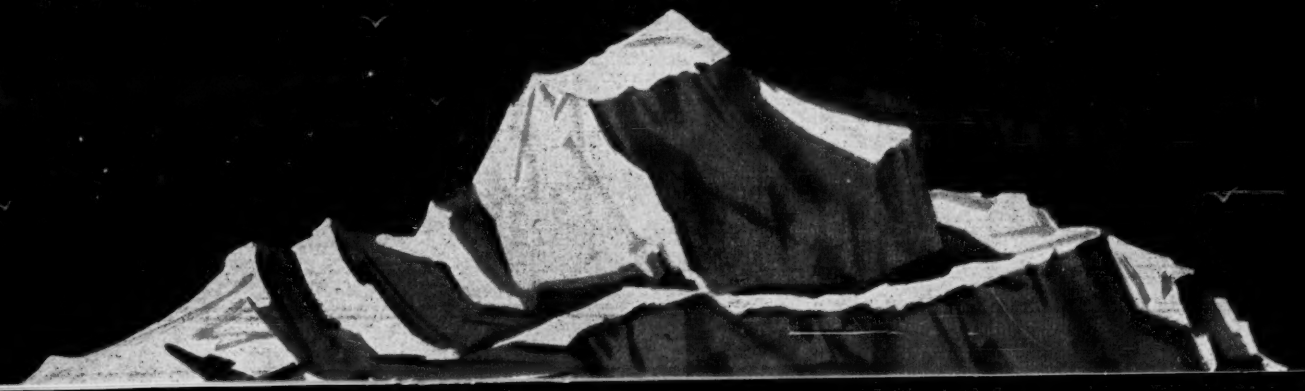

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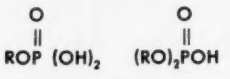

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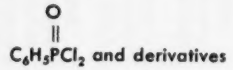

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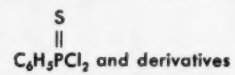
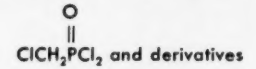
Phenylphosphonothionic Compounds



Chloromethylphosphonic Compounds



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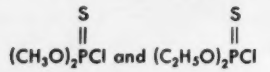

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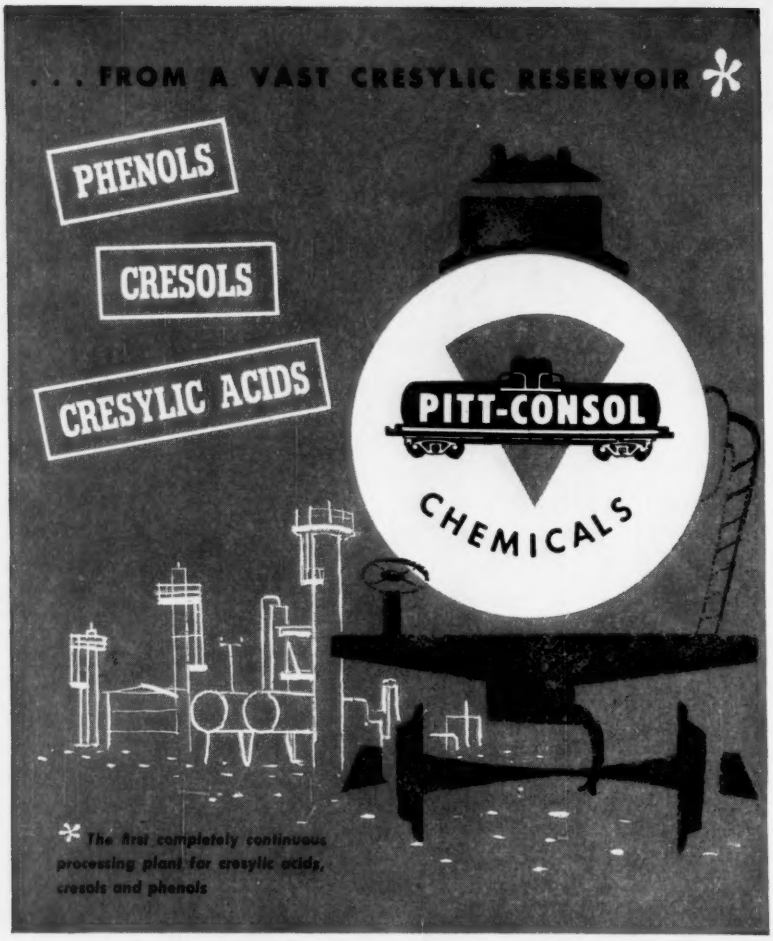
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OPINION

Not Only a Softener

TO THE EDITOR: I thought your water article (*March 2, p. 58*) was very good.

One slight angle on your treatment . . . is that lime is not used solely for softening. In cities that obtain their potable water from muddy rivers, lime is essential for proper coagulation, usually with alum. I am referring to cities like New Orleans, Oklahoma City and St. Louis. Actually about two-thirds of lime used goes for softening and about one-third for coagulation and pH control.

ROBERT S. BOYNTON
General Manager
National Lime Assn.
Washington, D. C.

MEETINGS

Society of Plastics Engineers; theme: Plastics in Building; Statler Hotel, New York, April 3.

American Chemical Society, 131st national meeting, Miami, April 7-12.

American Management Assn., 26th annual national packaging conference, Palmer House, Chicago, April 8-10.

American Institute of Mining, Metallurgical and Petroleum Engineers, open hearth and blast furnace conferences, Penn-Sheraton Hotel, Pittsburgh, April 8-10.

Chemical Progress Week, April 8-12.

Bituminous Coal Research, annual meeting, the Greenbrier, White Sulphur Springs, W. Va., April 18-19.

American Industrial Hygiene Assn., conference, Kiel Auditorium, St. Louis, April 22-26.

Assn. of Consulting Chemists and Chemical Engineers; symposium: International Science—a Catalyst for World Security; Belmont Plaza Hotel, New York, April 24.

American Zinc Institute, Inc., 39th annual meeting, Drake Hotel, Chicago, April 25-26.

Scientific Apparatus Makers Assn., 39th annual meeting, the Greenbrier, White Sulphur Springs, W. Va., April 27-May 2.

American Oil Chemists' Society, 48th annual meeting, Roosevelt Hotel, New Orleans, April 29-May 1.

American Materials Handling Society, materials handling conference, Convention Hall, Philadelphia, April 29-May 3.

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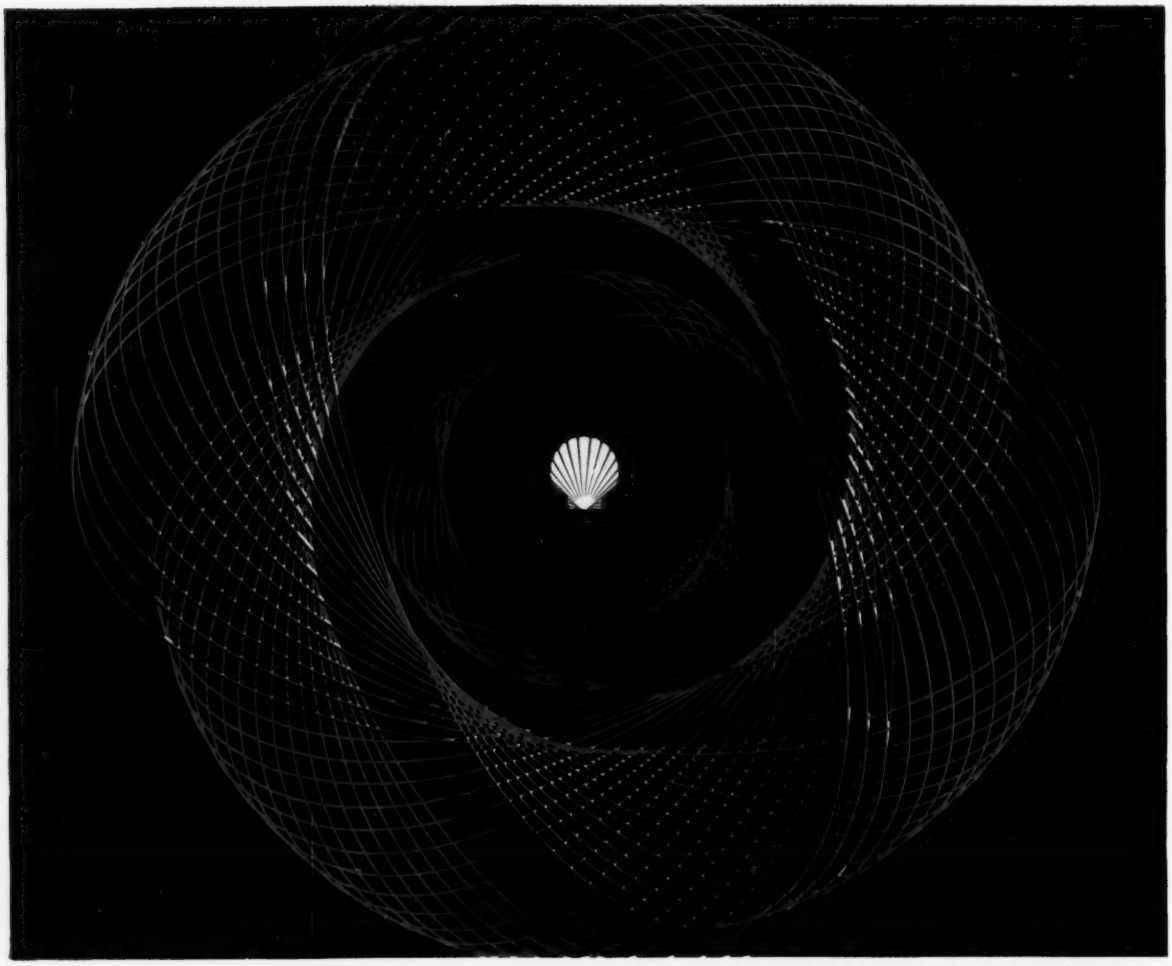

"Integration," an impression by C. Arthur Rosser

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SHELL

Business
Newsletter

CHEMICAL WEEK
March 30, 1957

The Metal & Thermit proxy fight is waxing hotter. Last week a committee of independent stockholders, officers and directors filed a suit in New Jersey Superior Court seeking an injunction to postpone the company's annual meeting from April to June (*CW, March 9, p. 21*). The committee's charge: M&T management has made fraudulent and misleading statements to stockholders in its annual report.

The move is the latest in a proxy battle whose outcome will determine whether American Can Co. will continue to have a large voice in determining M&T's operating policies. American Can owns some 22% of M&T common, 6% of preferred stock. M&T's president, H. E. Martin, backed by Canco, hopes to elect 10 officers to the 12-man board, while the independent group seeks representation for seven of its nominees.

American Can Co.'s president, William Stolk, claims Canco has no desire to dominate M&T. Martin claims that nine of the company's 11 top executives are in favor of his policies.

•

Squibb has dropped its plans to close its Brooklyn plant, move it to New Brunswick, N. J. (*CW, Nov. 10, p. 24*). The 99-year-old plant, base of the pharmaceutical operations of E. R. Squibb Division of Olin Mathieson, had been declared inefficient, too costly to modernize. But at the urging of Local 14-138 of the Oil, Chemical and Atomic Workers, and the Brooklyn Chamber of Commerce, Squibb made "intensive engineering studies", finally found a way to solve its production problems.

Close to 1,200 workers were employed at the plant, located at the foot of Brooklyn Bridge; less than one quarter would have been able to transfer to the New Brunswick operation.

•

Chicago's having trouble buying enough fluoride for its water supply. To treat some 900 million gal. of water every day, the city uses some 2¼ tons of commercial fluoridating liquid (25-26% hydrofluosilicic acid, 19% elemental fluorine). International Minerals and Chemical, which supplies the liquid, says that right now fertilizer production—main source of IMC's commercial fluorides—is just starting its acidulation season. So the supply is still small. IMC is converting new plants to the extraction of the commercial fluoride, hopes to have immediate supply problems licked in two to three weeks, and plenty of capacity to meet all demands by August.

Carbide will double production of acrylonitrile at its Institute, W. Va., plant, hopes to have the expansion completed by mid-'58. Demand for such acrylonitrile-based products as acrylic fibers, high-impact resins, Buna-N rubber and derivatives including diethylaminopropylamine and dimethylaminopropylamine, is cited as spurring the expansion.

Carbide's office expansion plans—it's putting up a new office building on New York's Park Avenue—gave the firm a chance at some novel community relations. The company sent out some 10,000 letters to property owners and tenants in the area of its new structure apologizing for creating serious noise and dust problems by its demolition of an old hotel. To Carbide's surprise, it has received over 300 notes thanking it for its consideration.

•

A staff shuffle is in the works for the Senate Antitrust Subcommittee. The group, headed by Kefauver and O'Mahoney, last week lost Jesse Friedman, top staff economist (*CW, Feb. 23, p. 21*). Friedman has been directing the preparation of an important statistical study of concentration in industry. Burden of finishing the study, expected basis for extended committee hearings, now falls on the staff's chief economist, John Blair, ex-Federal Trade Commission man.

Benzene will be Richfield Oil's first commercial petrochemical venture, a distinction that was expected to go to phthalic acid. (*CW, April 2, '55, p. 52; Dec. 1, '56, p. 102*). The firm plans a 16-million gal./year benzene unit at its Watson, Calif., refinery, hopes to have it onstream by mid-'58.

Richfield's phthalic plant, set aside for the time being, probably won't be abandoned entirely. The firm is continuing its evaluation of processes, products and markets.

•

Chemical companies' cash dividend payments set a January high, according to U.S. Dept. of Commerce. About $23.6 million was paid out by chemical corporations issuing public reports; in January '56, the payoff amounted to $21.7 million. Manufacturing industries as a whole showed a slight ($0.5-million) decrease, and more substantial decreases in mining, trading, and railroad industries brought the total in '57 to only $801.5 million, compared to last year's $808.7 million.

•

Dow Corning has stopped retailing silicone-treated tapes. Reason: they're "too popular". DC began making the silicone-rubber-coated glass-cloth tapes to introduce them to industry for applications like cure-in-place insulation of motor coils and flexible heating elements. Now that the tapes have caught on, DC has turned manufacture over to three firms: Budd Co.'s Continental Diamond Fiber Division; Permacel Tape Corp.; and H. K. Porter Co.'s Quaker Rubber Division.

•

The public relations aspects of air and water pollution *(see p. 32)* will be one of several subjects up for discussion by the 200-plus who are slated to attend the Manufacturing Chemists' Assn.'s air and water pollution conference at Washington's Shoreham Hotel, April 4 and 5.

BRIEFS for buyers of

Caustic Potash
Carbonate of Potash
para-Dichlorobenzene
Phosphorus Compounds

CHEMICAL PROGRESS WEEK-APRIL 8-12

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1. Hydrate regular (granular) 83.5% to 84.0%
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3. Calcined powder 99.2% to 99.6%
4. Powder 91% to 94%
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For details on the form that meets your needs best, use the coupon to request technical data.

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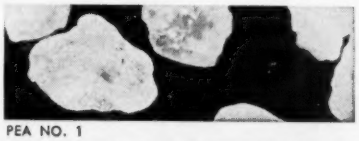
For data sheet, check the coupon.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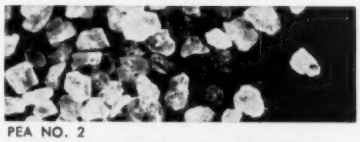
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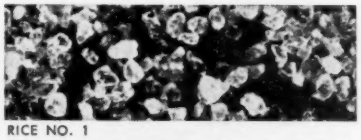
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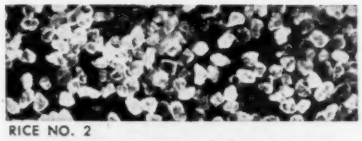
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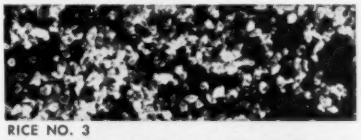
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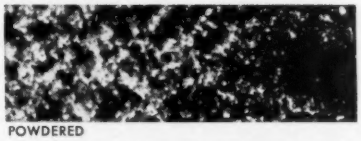
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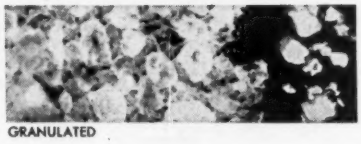
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Elemental phosphorus: white-yellow—P_4 and red—P_X

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phosphorus sesquisulfide—P_4S_3

Chlorides: phosphorus trichloride—PCl_3
phosphorus pentachloride—PCl_5

Phosphorus oxychloride—$POCl_3$

Phosphorus pentoxide (phosphoric anhydride) —P_2O_5

Acids: phosphoric acid, ortho—H_3PO_4
phosphorous acid, ortho (phosphonic) —H_3PO_3
hypophosphorous acid (phosphinic) —H_3PO_2

Alkyl acid phosphates: —$(RO)_2P(O)OH + ROP(O)OH_2$

Calcium hypophosphite—$Ca(H_2PO_2)_2$

Potassium hypophosphite—KH_2PO_2

Zinc phosphide—Zn_3P_2

Tetrakis (hydroxymethyl) phosphonium chloride, "THPC"—$(CH_2OH)_4PCl$

For further information on any of these Oldbury chemicals, please write to Hooker Electrochemical Company, Oldbury Products, 19 Rector St., New York 6, New York.

For more information on chemicals mentioned here, check below:

- ☐ NIALK Caustic Potash, Regular Grade
- ☐ NIALK Caustic Potash, Low-chloride Grade
- ☐ NIALK Carbonate of Potash
- ☐ PARADI

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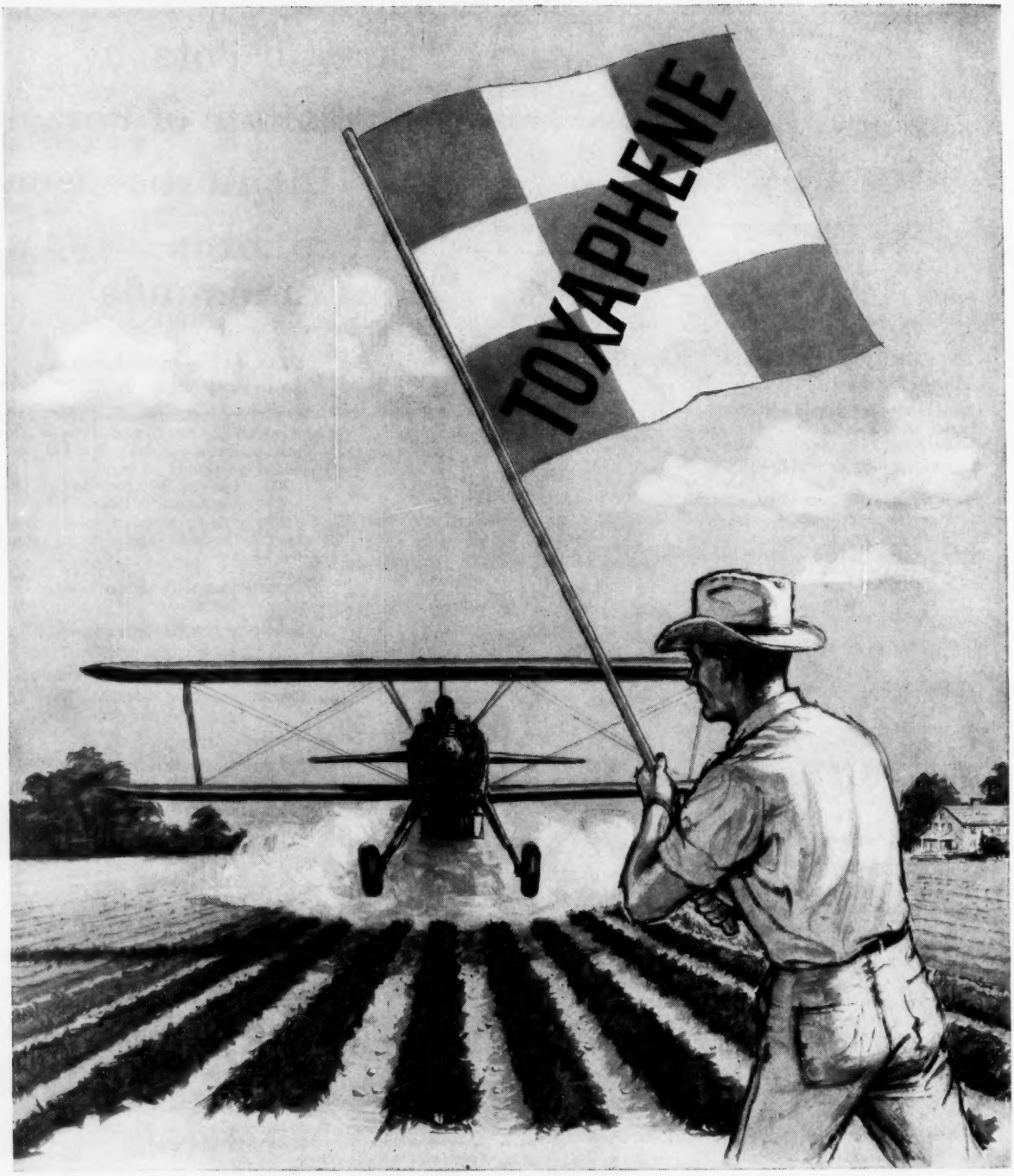

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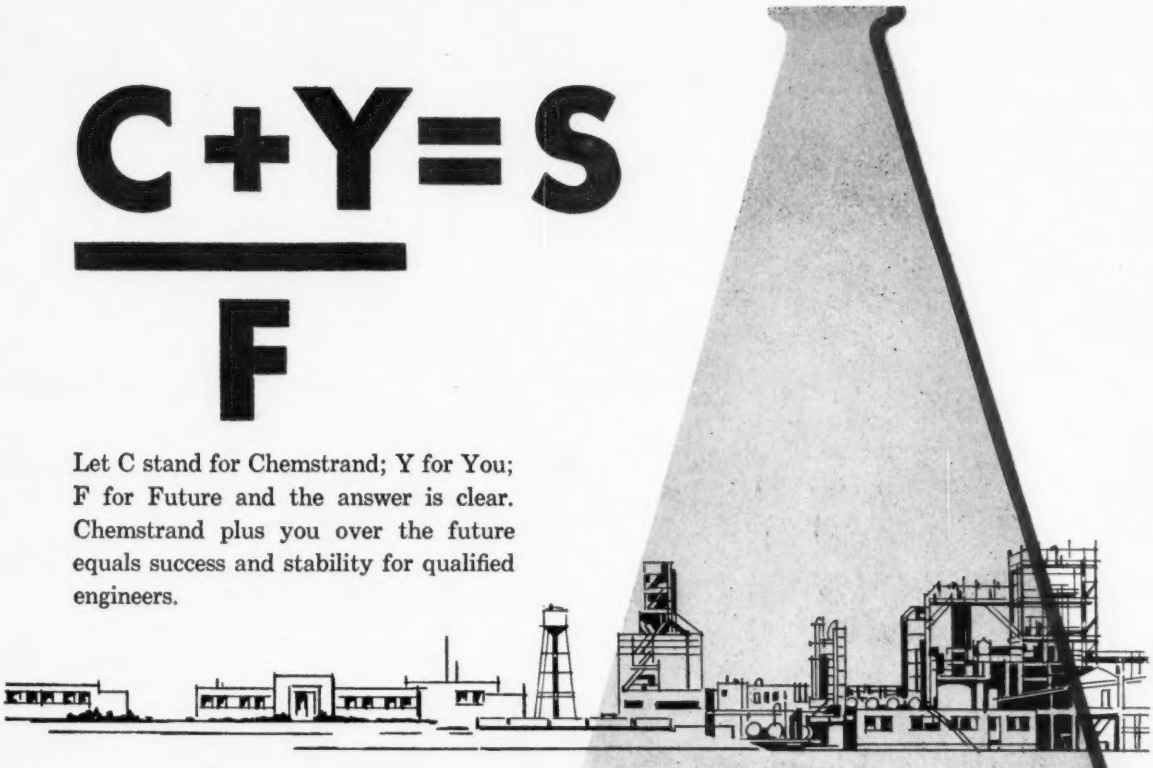

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Immediate openings for Engineers in various fields, particularly chemical, mechanical, industrial, textile and instrument engineering.

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THE CHEMSTRAND CORPORATION, DECATUR, ALABAMA

TECHNICAL PERSONNEL MANAGER, Dept. (CW-10)
The Chemstrand Corporation
Decatur, Alabama

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I am a graduate _____ engineer.
Please send me information concerning the ground floor opportunities at Chemstrand.

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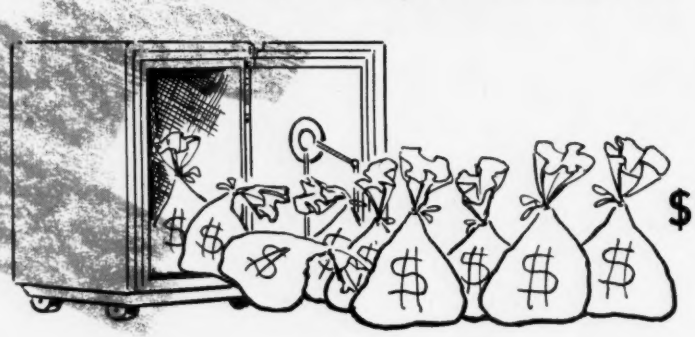
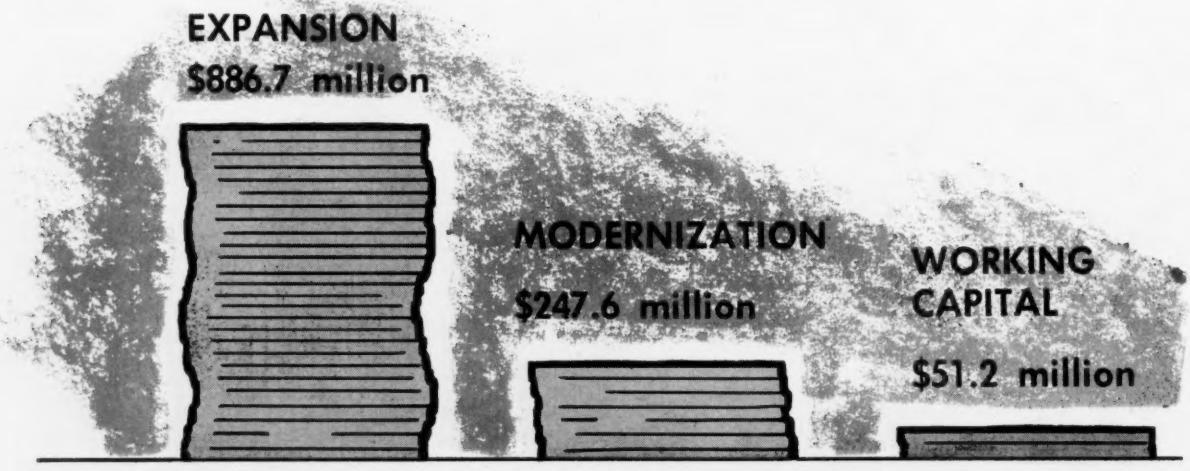


$1045.4 million

PLUS SOME BORROWING FROM OUTSIDE...

$140.1 million

28 CPI firms this year will put $1,185.5 million into...



Digging Down For '57 Expansion

The chemical industry plans to spend a record $1.9 billion for capital expenditures in 1957 (*CW, March 23, '57, p. 22*), and the primary source of funds to finance this spending will be—as it has been for some time now—the company coffers.

A recently completed *CW* survey of 28 companies (*see p. 18*) indicates that firms accounting for *66%* of this year's estimated capital expenditures will get almost 88% of their funds from within—relying on external financing for less than 12%. These figures are strikingly similar to those for 1956 expenditures (*see p. 19*). Big difference this year is that a substantially larger portion of internally generated funds will come from depreciation accruals.

Competitive price pressures which last year lowered profit margins for a good many products are cited as a major factor in the 1957 expansion pace slowdown. Securities and Exchange Commission and U.S. Dept. of Commerce survey figures place the estimate for '57 capital expenditures at $1.7 billion for an increase over '56 of $344 million, or 25%—compared with last year's $439 million (43%) increase over the 1955 outlay.

The SEC-Commerce survey is the second covering industry plans for '57. The first, a bit more optimistic, was made last fall by McGraw-Hill's Bureau of Economics. Government analysts are quick to point out that their survey indicates healthy undertones. If their figures are borne out, they say, solid expansion is in store for most industrial lines, and industries cutting their plant and equipment outlays below estimates will be in the minority.

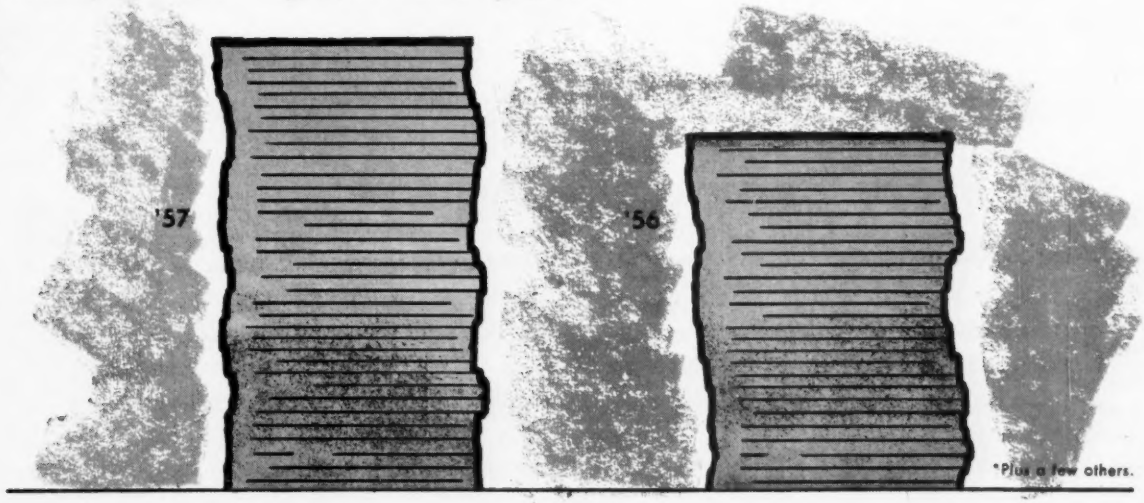
Among the chemical companies responding to *CW's* survey, there is a net gain in expected outlays of $2.3 million over previous estimates by the same companies, indicating that, if anything, chemical firms are revising their capital-spending plans upward as the year wears on.

Tight Working Capital: In addition to lower margins, another factor credited by some with slowing the expansion pace is tight working capital—resulting from Federal Reserve restrictions on bank credit.

Sidney Feuchtwanger, president of Commercial Discount Corp. (Chicago) reports that his company's survey shows that industrial chemical manufacturers are among those whose working capital is tightest.

"In the days of easier credit," Feuchtwanger says, "companies could count on low-interest bank loans to tide them over a swell in sales. If they felt they needed cash for the longer term, the bond market was

The total is $209.2 million more than these companies* spent last year.



Digging Down For '57 Expansion

1957 CHEMICAL WEEK EXPANSION SURVEY

Please indicate method(s) you plan to use to finance 1957 expansion and amount you expect to use from each source.

A. INTERNAL SOURCES

a) ✓ retained earnings — $371.4 million

b) ✓ depreciation accruals — $593.2 "

c) ✓ sale of U.S. Government bonds — $30.3 "

d) ✓ others, specify sale of property, cash on hand, etc. — $50.5 "

B. EXTERNAL SOURCES

1. Equity Financing:

a) ✓ common stock issues — $5.3 million

2. Debt Financing:

a) ✓ bank loans (current) — $51.9 "

b) ✓ bank loans (term) — $68.5 "

(Note: Are your bank loans temporary, to be refunded ____, or to be paid off out of earnings ____?)

c) Debentures:

✓ maturities — $7.2 million

____ sinking fund — $____

d) ✓ preferred stock — $0.5 "

e) ✓ others, specify long-term debt, insurance company loans, etc. — $6.7 "

C. How much of your 1957 expansion budget is for each of the following:

1. Modernization — $247.6 million

2. Expansion — $886.7 "

3. Working capital — $51.2 "

4. Others, specify ____ — $____

D. TOTAL EXPANSION BUDGET FOR 1957 — $1185.5 million

1. Is this figure less $____, ~~same~~, or more $2.3 million than originally estimated?

E. Please use reverse side for your comments on the present financing situation as it pertains to your particular needs.

Signed_____, title_____, Co._____

1957 expansio total for 28 major chemica companies.

The Story Behind the Figures

This survey form was sent to about 200 chemical companies, brought in the figures that went into the totals shown above. Returns represent 14.5% of the canvassed group, compared with a 20% return on a more limited form used last year. The surveys for both years are similar in that they reflect expansion plans of the major chemical companies. Last year's numerical advantage was made up mostly of replies from smaller firms, whose returns — while important in pointing up trends—would not have significantly changed the totals for '57 if they had been included this year.

ready to provide it. Neither source of working capital is readily available nowadays on the terms the companies are eager to accept. Smaller and medium-sized manufacturers find bank money hard to get at any rate, and the bond market is out of the question."

The conclusion reached by Commercial Discount Corp. is that the Federal Reserve policy of tightening bank credit is working well, that it has forced many manufacturers to eye their cash outlays, scrutinize their collection methods, and give considerable thought to more vigilant financial supervision.

This situation puts a premium on getting more mileage out of the dollars that are already flowing through the company. *CW*'s survey would indicate from the size of the amount—$51.2 million—to be turned into working capital, that at least part of the funds that might have been used for capital expansion will be deferred to other uses.

FEW SWITCHES ON SOURCES

(In millions)

Source of funds	1956		1957	
Retained earnings	$482.0	49.4%	$371.4	31.3%
Depreciation accruals and other internal sources	390.0	39.9%	674.0*	56.9%
TOTAL INTERNAL	**872.0**	**89.3%**	**1,045.4**	**88.2%**
Common stock issues	38.8	4.0%	5.3	0.4%
Bank loans	12.0	1.2%	120.4	10.2%
Debentures	36.5	3.8%	7.2	0.6%
Other external sources	17.0**	1.7%	7.2***	0.6%
TOTAL EXTERNAL	**104.3**	**10.7%**	**140.1**	**11.8%**
COMBINED TOTALS	**976.3**	**100.0%**	**1,185.5**	**100.0%**

*Depreciation accruals $593.2 million, available cash $47.7 million, sales of U.S. bonds $20.4 million, sales of other property $1.8 million, amortization of intangibles $0.9 million, source not specified $10.0 million.
**First mortgage bonds $17.0 million.
***Insurance company loan $5.0 million, other long-term debt $1.7 million, preferred stock $0.5 million.

1956 v. 1957: Comparing *CW*'s '56 survey results with '57's, it is readily apparent that there have been certain noteworthy changes in the methods of financing capital expenditures.

While the percentage of funds to be provided from internal sources is almost identical for both years, the emphasis has shifted from retained earnings to depreciation accruals.

The 28 firms responding to the survey intend to raise almost 50% of their funds through depreciation accruals, compared with 40% in '56. Several factors account for this change.

For one thing, company after company is reporting substantial increases in depreciation charges against '56 income.

• From Koppers Co. (Pittsburgh): "Charges for depreciation, amortization and depletion, which provide for the recovery of the capital cost of plants and equipment, continued to increase and in 1956 amounted to $11.9 million as compared with $10.2 million in 1955 and $7.8 million in 1954. This increase is due in part to the high level of recent new construction and acquisitions. Also, accelerated depreciation taken during 1956 on the declining balance basis (as allowed under the Internal Revenue Code with respect to new properities acquired or constructed) was $1.6 million in excess of straight-line depreciation. Included in the 1956 charge is $2.4 million for 60-month amortization under certificates of necessity.

• Union Carbide and Carbon Corp. reports: "Depreciation, depletion and amortization charged against income in 1956 amounted to $113,888,642 . . . 5% over 1955. Of this increase, approximately $2,783,000 . . . is attributable to the adoption of the sum-of-the-years-digits method of computing depreciation for property acquired in the U.S. after Jan. 1, 1956. This method . . . provides for writing off more of the cost of an asset in earlier years, and less in subsequent years, than does the straight-line method."

• Stauffer Chemical Co. (New York) reports an increase in depreciation and amortization charges for 1956 of $10.8 million. The charges include accelerated amortization on facilities constructed under certificates of necessity and sum-of-digits depreciation on most capital additions since 1954. Accelerated amortization, the company reports, exceeded straight-line depreciation on the certified facilities by almost $2 million in '56. Depreciation by use of the sum-of-the-digits method exceeded straight-line depreciation by $1.1 million for the same period, as against only $375,000 in 1955.

Fast Writeoffs: The subject of fast writeoffs for tax purposes has been extremely controversial of late, with government closing out more and more of the original 225 expansion goals for which certificates of necessity were granted.

The program itself—which permits firms to write off in five years industrial expansion projects considered by the Office of Defense Mobilization as necessary to defense—has been defended by businessmen. They claim it's necessary as an incentive for expansion of industrial capacity for defense. Others, including Secretary of the Treasury George Humphrey, attack the program as an unjustified loss of tax revenue.

Of the original 225 goals established by the government, only 17 remain open, and as the goals are closed out and certificates are no longer issued for that particular industry, the program gains additional opponents from the ranks of those who are no longer eligible for certification.

Charges of "undemocratic" and "unfair distribution of the tax burden" are heard most frequently, and recently, the Joint Congressional Committee on Internal Revenue Taxation reported

Digging Down For '57 Expansion

that the fast writeoffs had originated during the war emergencies (Korean War), and that they might not be the best way to encourage construction during a "semi-mobilized period which may continue for many years."

The Joint Committee suggested that Congress be granted veto power over writeoffs on specific projects and that the amortization period might be extended from five to 10 years in the case of capital assets having a long, useful life.

Still another factor of perhaps even greater interest to chemical management is the controversy concerning inflation and its effects on recovery and replacement values.

"Replacement costs," Union Carbide and Carbon Corp. Treasurer John Shanklin says, "are up, and we are not recovering over the long period the cost of replacements."

So acute and respected is the problem, the Manufacturing Chemists Assn. has a special committee, headed by Diamond Alkali Controller William Crichley, studying recovery and replacement values.

The committee is now examining plant expansions since '39 and the normal depreciation taken on these facilities. It will then work out what this depreciation should have been, based on the economic dollar depreciation. Crichley thinks the industry will be surprised at the conclusions of the study, which he says will show that depreciation allowances have been much more inadequate than most had suspected. Manufacturers will find "they have been giving their plants away. . .".

A primary aim of the committee is to fight any changes—as suggested by the Joint Congressional Committee—in the liberalized depreciation rules of 1954, which Crichley says are "sound and needed and don't cost the government a cent. They don't cut taxes, but merely defer them."

As to the future of the Crichley report, the chairman says that will depend on what it shows and what MCA directors decide to do with it. One possible outcome: joining the steel industry in bucking for relief legislation.

Small Company Borrowing: As would be expected—and as the table *(this page)* shows—smaller companies are more apt to use external sources to supply funds for capital expansion than their bigger brothers.

Aside from the fact that smaller firms are almost certain to have less internal money available, there appears to be a slight advantage for these firms when they borrow from banks.

The Federal Reserve Bank of Chicago reports that the cost of borrowing by small businesses has gone up less rapidly since mid-1955 than interest rates on loans to large concerns.

The bank says rates on loans above $500,000 have risen more than 30% during this period, compared with a 15% rise for loans of less than $30,000. This is attributed to the fact that the "pure interest" cost of borrowing—the basic price of money—has risen more in comparison with the other borrowing costs.

Administrative and processing costs, the bank says, account for the largest portion of the charges on small loans, but such costs have risen more slowly than the interest rate.

Where To Now: The chemical industry continues to be the country's fastest growing industry, and there's no serious expansion cutback in sight.

Financing for future capital expenditures will most likely continue to come primarily from within, although, by 1960, depreciation accruals will play a less significant role. By then rapid tax writeoffs—which reached a five-year peak in '55 and were estimated even higher for '56—will have tapered off.

A steadily growing demand for chemicals, plus the industry's unrelenting search for more efficient ways of doing things, according to MCA President John Hull, will mean continued large investments in new facilities.

SMALLER FIRMS BORROW MORE

(Dollar figures in millions)

	15 Larger companies (Annual sales more than $100 million)		Six Medium-sized companies (Annual sales $50-100 million)		Seven Smaller companies (Annual sales less than $50 million)	
Retained earnings	$345.1	32.2%	$16.5	21.6%	$9.8	25.1%
Depreciation accruals	551.3	51.6%	25.7	33.7%	16.2	41.4%
Other internal sources	68.7	6.4%	12.1	15.9%	0.0	—
TOTAL INTERNAL	965.1	90.2%	54.3	71.2%	26.0	66.5%
TOTAL EXTERNAL	105.0	9.8%	22.0	28.8%	13.1	33.5%
COMBINED TOTALS	1,070.1	100.0%	76.3	100.0%	39.1	100.0%
Utilization:						
Expansion	799.0	74.6%	60.9	79.8%	26.8	68.5%
Modernization	230.4	21.6%	9.4	12.3%	7.8	20.0%
Working capital	40.7	3.8%	6.0	7.9%	4.5	11.5%

GRACE'S GRACE: He plans private production of reactor fuel.

Betting on Atomics

W. R. Grace & Co., already a diversified company, is broadening its line still further. It will build the first privately-owned plant to make raw materials for nuclear reactor fuel elements.

The plant is slated for Erwin, Tenn., rather than in Baltimore, as previously planned (*CW Business Newsletter, Mar. 9*), and will turn out uranium, thorium, rare earth alloys and metals for nuclear reactors. However, it won't produce finished fuel elements, but will supply only the raw materials for them. The plant will supplement Grace's rare earth and thorium operations now carried out at Pompton Plains, N. J., and Curtis Bay, Md.

New installations for the Erwin unit will include a solvent extraction plant to make pure thorium and uranium salts, a reduction plant to convert salt to metal powder or sponge, and a melting-casting unit for production of fabricated metal product.

The plant will be the first of its kind financed and operated entirely by private enterprise, says Grace. All similar units in the past have received at least some help from government agencies. W. R. Grace's president, Peter Grace, calls the plant "an expression of our faith in the future" of private development in the atomic energy field. Grace plans to get in on the ground floor.

Back in the Saddle

Edward Little, the hardy chairman of the board of Colgate-Palmolive Co., is again president of the firm. Last week he assumed the role when the presidency was resigned by William Sims II—second man to do so at Colgate within two years.

Little had been both chairman and president for 15 years, starting in 1938, but turned over the presidential post to Joseph McConnell (former president of the National Broadcasting Co.) in February, 1953. Following an interim period after McConnell resigned in May, 1955, during which Little again served as president, Sims was named president. Until last week, Little's position was that of board chairman and chief executive officer.

Long Service: Sims has served with Colgate for 33 years, was named a director in 1946. He was appointed the firm's international president in 1953 and was executive vice-president of the parent company until he became its president.

Sims, in a formal announcement, cited personal reasons for leaving Colgate. It's said, however, that Little has for many years exercised an almost absolute control over the company.

Little's concept of C-P activities, reports say, is primarily that of soapmaker and soap-seller; thus, plans for diversifying and expanding the business that do not fit this mold are difficult to execute.

C-P'S LITTLE: He's been in and out of the C-P presidency.

AIRCO'S MCFARLIN: His firm will make triple-bond alcohols.

First With Alkynols

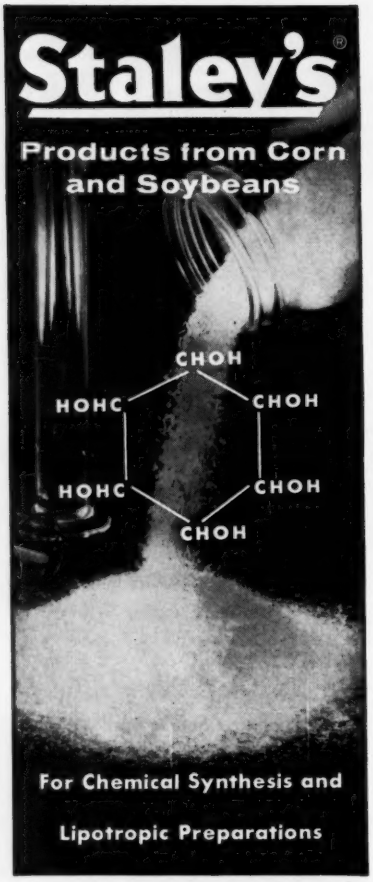
Air Reduction Chemical will make a major addition to Calvert City, Ky.'s $60-million industrial complex, and, at the same time, will mark an important "first" for domestic chemical production.

It will build a plant to produce methyl butynol and methyl pentynol—the first in the U. S.—in the Calvert City area.

The plant will produce 3 million lbs./year of the acetylenic alcohols by the end of this year, using a process that reacts acetylene with acetone and a basic catalyst. Explaining the need for such a unit, C. J. McFarlin, president of Airco Chemical, said new uses are being found for the alcohols as starting materials for flavors, perfumes, pharmaceuticals and speciality monomers *(CW, May 19, '56, p. 36)*.

The new alcohol plant is the fourth unit built by Airco on its 1,500 acre Calvert City site. And a fifth plant, say industry observers, may be on the way. The product: vinyl stearate. Airco says, however, that it has no definite plans to take further steps in this direction.

But even if Airco doesn't follow-through with a stearate plant, the company's concentration on acetylenic derivatives will still move substantially forward as the alcohol plant materializes. And when initial production gets underway this fall, Airco will be one of the largest domestic producers of triple-bonded acetylene derivatives.



INOSITOL N. F.

Inositol N. F. is a product that holds great promise, not only for medicine, but for many fields of industry.

A recognized member of the B-Complex vitamin group, it has several applications in the pharmaceutical industry. It is used either alone or with certain vitamins, as a lipotropic agent. The six hydroxyl groups in the Inositol molecule lend themselves to esterification and ether formation. It is also used in chemical synthesis.

You can depend on Staley, one of the leading corn processors and chemical manufacturers, to supply your needs for a high grade, pure Inositol compound. At your request, Staley will be glad to send complete data, or to meet with you to discuss your Inositol requirements.

For information about other Staley products; Lecithin, Leucine, Phytic Acid, Inositol, Tyrosine, MSG, HVP, Calcium Phytate, Amino Acid Mixtures, Corn Steep Liquor and Fermentation Nutrients, write:

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COMPANIES

Aluminum Co. of Canada, Ltd., subsidiary of Aluminum Ltd., will file a registration statement with the U.S. Securities and Exchange Commission covering a proposed issue in this country of $125-million worth of debentures. Negotiations are now underway with First Boston Corp. and Morgan Stanley & Co. to head the group of underwriters. Proceeds would be used to pay off bank loans and continue the firm's expansion program. By 1961, the company hopes to double the capacities of its Canadian aluminum smelters and supporting hydroelectric power stations.

FOREIGN

Aluminum/Peru: The Cerro de Pasco Corp. (New York) is considering building an aluminum reduction plant in Peru. The firm, which has extensive copper, lead, zinc, silver and gold operations in Peru, has obtained a government concession to build a hydroelectric plant on the Mantaro River there. The power plant will cost an estimated $200 million, have a potential of 750,000 kilowatts—much more than could be used by existing Peruvian industry. Cerro de Pasco plans to build an aluminum works near the Bay of Paracas, take advantage of the power and good Peruvian ports to bring in alumina, send out aluminum. Cerro de Pasco is already in the aluminum fabricating business; it owns Fairmont Aluminum Corp., Fairmont, W.Va. (capacity: 30 million lbs./year).

•

Pulp/Alaska: The Alaska Lumber & Pulp Co. has raised $36.5 million of the $55.5 million which will be needed to build its pulp mill at Sitka, Alas. This amount has been raised from Japanese sources, principally rayon makers. Originally it was planned to obtain only $28.5 million in Japan, get the rest in the U.S., but the tight American money market would have made that plan difficult to carry out. The company plans to start construction in June or July.

EXPANSION

Natural Gas: Texas Eastern Transmission Corp. and its subsidiary, Texas Eastern Penn-Jersey Transmission Corp., have asked the Federal Power Commission to authorize expansion projects that will add 110,000 MCF/day of natural gas to Texas Eastern's capacity. Total cost will be approximately $30 million. The applications request authority to add 67,610 horsepower of compression facilities and 137 miles of pipeline to Texas Eastern's system.

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Barite: American Colloid Co., Chicago, Ill., has purchased seven barite claims located 50 miles north of Wells, Nev. A company spokesman said the firm was interested in developing the mineral claim for several uses, including production of materials suitable for use as shielding for nuclear reactors.

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Lithium: American Metal Co. (New York) is negotiating with Montgary Explorations Ltd., Toronto, to participate in developing the Canadian firm's lithium mine at Bernic Lake, north of Winnepeg, Man. Montgary, basing estimates on preliminary explorations, says the ore body comprises 8 million tons of ore with an average assay of 1.85% Li_2O. Market value: $160 million.

Present plans call for a 650 foot shaft and 1000 tons/day flotation concentrator to be completed before the end of '57.

Harshaw

ALUMINUM ISOPROPYLATE

(DISTILLED)

EFFICIENT INTERMEDIATE IN MANY REACTIONS SUCH AS:

1. Meerwein-Ponndorf Reactions
2. Alcoholysis and Ester Exchange
3. Formation in situ of Aluminum Soaps
4. Synthesis of higher Alkoxides, Chelates and Acylates

Properties

Formula Weight	204.23
Melting Point	118° C.
Boiling Point	145° C. at 7 mms.
Appearance	White Solid
Purity	99.7%

Soluble in benzol, chloroform, carbon tetrachloride, petroleum hydrocarbons, isopropanol. Easily hydrolyzed and alcoholized.

Make Harshaw your source for this useful intermediate which holds great promise as a building block in a host of reactions. Aluminum Isopropylate is the first in a series of Aluminum Chemicals offered by Harshaw for new exploratory research.

For more detailed information and sample contact New Products Division, The Harshaw Chemical Co., 1945 East 97th Street, Cleveland 6, O.

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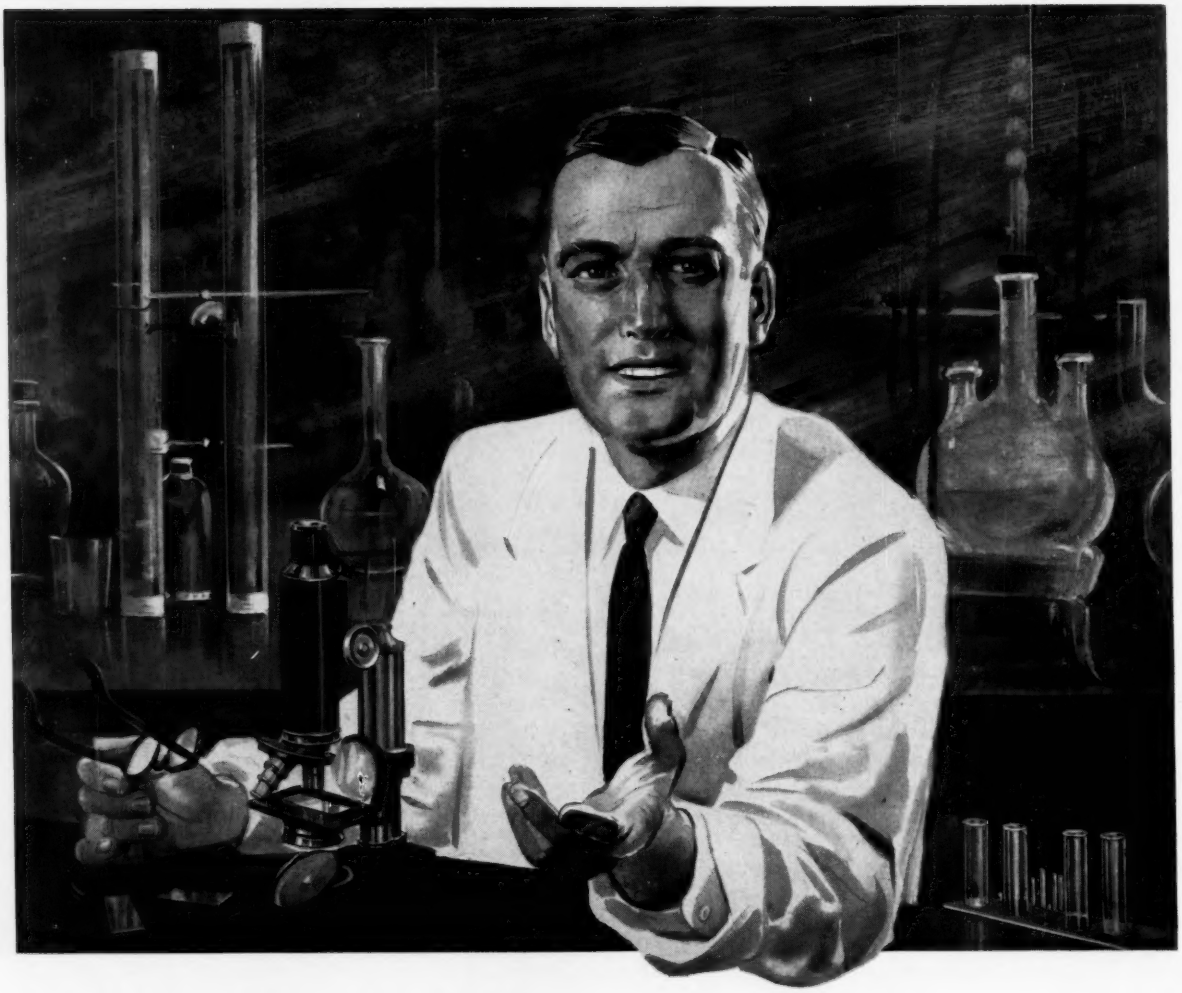
HARSHAW



Ask the man from Vanderbilt... about the NEW FORM of regular VEEGUM

VEEGUM F, the latest addition to the Veegum series of inorganic suspending and emulsifying agents, is now available as a micro fine white, free-flowing powder.

VEEGUM F is regular Veegum ground so fine that substantially all will pass through a 325 mesh screen.

With all the advantages of Veegum, this form is of special interest to those who formulate dry and are looking for an agent that will rehydrate rapidly.

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Veegum is a purified colloidal magnesium aluminum silicate. Available in several forms, it offers very superior suspending and emulsifying qualities.

Veegum disperses hydrophobic materials in water systems without lowering surface tension. Emulsions of many types of oils, fats, and waxes are permanently stabilized by less than one percent of Veegum. Aqueous dispersions of Veegum are compatible with alcohols, polyglycols, and other organic solvents.

Veegum gives high solids suspension at low viscosity with improved stability.

Veegum is nontoxic, nonirritating, opaque, white, odorless, and tasteless.

Please send

☐ **VEEGUM** Bulletin C122 and data on **VEEGUM F** ☐ **VEEGUM F** sample

(state application) _____

NAME _____

POSITION _____

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R. T. VANDERBILT CO. SPECIALTIES DEPARTMENT 230 PARK AVE., NEW YORK 17, N. Y.

Washington
Newsletter

CHEMICAL WEEK
March 30, 1957

Propaganda will be pushed in food and drug law enforcement. The House Appropriations Committee, which usually frowns on such activity, has okayed FDA plans to hire a $11,610/year information and education director, as well as staffers to "develop and direct a broad, well-coordinated program aimed at promoting compliance" with the laws and rules safeguarding the consumer's health and pocketbook.

Industry has some fears about the idea. You will see more companies prodding FDA to spike those "scare stories"—now spreading to the big-circulation media—that term chemicals used in foods cancer-causing materials. While such officials as FDA Deputy Commissioner John Harvey have been emphatic in their denials of this point, some industry sources have felt that in the past FDA has at least tacitly encouraged distorted stories on similar matters.

FDA will move cautiously on this educational program. The agency fears it would lose industry support for the big staff expansion now underway if it moves too fast. Already the agency has decided to postpone until 1965 its target date for a tripling in size. Some congressmen have wanted it to reach that goal in 1960.

•

You can look for these actions soon from FDA: legislation—a new, tougher food additives law; a bill to bring paints, more household chemicals under the caustic poisons act.

New drug enforcement—faster clearance of new drug applications; a start on factory inspections to check compliance with new drug application label specifications; a hard look at claims for sustained-release enteric-coated capsules.

Pesticides—a sharp step-up in present "sketchy" plant inspections; a symposium to educate state agency chemists on dangers to foods from farm-chemical contamination.

Food chemicals—work on new methods to weigh risks to consumer health from use of new food processing techniques.

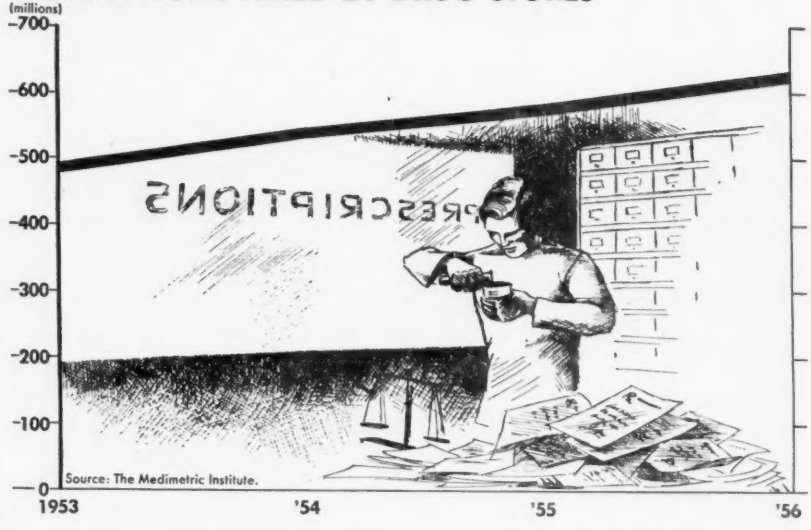
•

Bureaucracy's spoor: The Public Health Service is being badgered by queries for its view on the safety of plastic pipe, mainly from states and cities that now ban its use. The agency won't take a position, but is pushing for a uniform state plumbing code with rules on synthetic pipe. . . . Government scientists disclose that tests disprove drug addiction claims against reserpine and chlorpromazine tranquilizers. But they admit they're still probing the meprobamates (Miltown, Equanil), hope to have findings on these soon.

Charting Business

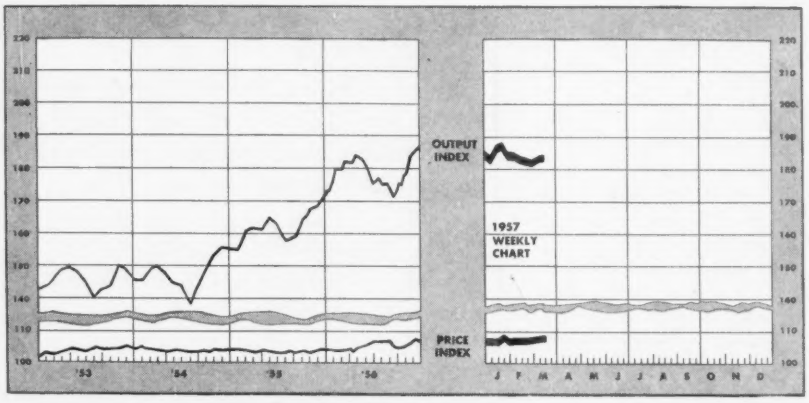
CHEMICAL WEEK
March 30, 1957

PRESCRIPTIONS FILLED BY DRUG STORES



Hormones, Tranquilizers Mean Business

The total number of prescriptions dispensed by domestic retail druggists last year came to 629 million; that's 9% higher than '55's 577 million. Significantly, more than half the total increase can be attributed to sales of tranquilizers and hormones, while notable gains were also scored by blood-pressure drugs. Other categories showing above-average increases; stimulants, antihistamines.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week Output Index (1947-49=100)	185.3	184.7	183.2
Chemical Week Wholesale Price Index (1947=100)	108.6	108.7	105.6
Stock Price Index of 11 Chemical Companies (Standard & Poor's Corp.)	41.79	41.61	50.74

MONTHLY INDICATORS—Trade (Million Dollars)	Manufacturers' Sales			Manufacturers' Inventories		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturing	29,113	28,684	27,023	51,488	51,397	46,299
Chemicals and allied products	2,071	2,086	1,931	3,758	3,689	3,248
Petroleum and coal products	2,827	2,593	2,475	3,122	3,123	2,754

10 Billion gallon flow in 7 years... but not a drop of maintenance

Every day, over four million gallons of water from paper-making operations flood through this tank. It is part of Scott Paper Company's $600,000 system for recovering fibers and controlling stream pollution. About six tons of fibers are recovered in a single day.

In the seven years since the tank was installed, some 10½ billion gallons of pulp-laden water have passed through it. Yet in spite of the abrasive action, the original inside tank coating, based on BAKELITE Brand Vinyl Resins, has never required maintenance.

Make your own test of a coatings system based on BAKELITE Vinyl Resins. Tough, tight-sticking, highly resistant to chemicals, gases, weather extremes and hard usage, these coatings are formulated for metal, masonry, concrete, and wood—for interiors and exteriors. Get the facts from your supplier, or write Dept. WN-34 for our free booklet, "BAKELITE Resin Coatings for the Chemical Industry."

Gates Engineering Company, applied a "Gaco" coating system to the inside of this tank owned by Scott Paper Company, Chester, Pa. The tank is 40 feet high, 20 feet across. Five coats were sprayed on its interior, alternately gray and black to insure complete coverage. In seven years, it has required no maintenance.

BAKELITE
BRAND
RESINS

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A Division of Union Carbide and Carbon Corporation UCC
30 East 42nd Street, New York 17, N. Y.

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U.S. PETROCHEMICAL EXPORTS TO MEXICO

	1954		1955		1st 6 mos. 1956	
	million lbs.	$ million	million lbs.	$ million	million lbs.	$ million
Synthetic resins	19.0	6.1	18.3	5.9	10.0	3.2
Ammonia compounds other than fertilizer	14.6	0.8	33.0	2.0	13.3	0.7
Anhydrous ammonia and other nitrogenous fertilizers	88.6	3.7	233.2	8.7	112.0	4.0

Coming: Petrochemicals in Mexico

A Mexican petrochemical industry is still in the discussion stage, with a final go-ahead resting with the government. But when (and if) the industry is developed, much of the capital and technical knowhow will come from U.S. firms.

This is the consensus of U.S. and Mexican businessmen who are anxiously awaiting the opportunity to begin petrochemical development. Foremost in the minds of these individuals is the question: To what extent will Petróleos Mexicanos (Pemex), the government oil monopoly, enter into the program?

As a partial answer, at least, Antonio Bermudez, director general of Pemex (*cut*), said recently that the petrochemical business is a wide-open field for private capital investment. Although the bulk of raw materials used will come from Pemex, he said, the government apparently does not have the slightest monopolistic intent in this area.

Some Production Now: Although the real start in petrochemicals in Mexico is expected momentarily, there is already some production of this nature. One notable entry: Monsanto Mexicana, a subsidiary of Monsanto Chemical Co. (St. Louis, Mo.). The company produces seven million lbs. of polystyrene annually, all of which has been shipped to local fabricators for processing. (Last week, however, it contracted to sell 1.1 million lbs. for export to Spain.) Monsanto also produces two million lbs. of polyvinyl chloride and 155,000 lbs. of cellulose acetate annually.

Expecting the go-ahead shortly, a number of companies have expressed an interest in building polyethylene plants in Mexico. These include National Carbon-Eveready, S.A., a subsidiary of Union Carbide and Carbon Corp.; Phillips Petroleum Co.; and Monsanto Mexicana.

BERMUDEZ: He pledges a wide-open field for private investments.

No one seems willing to guess how far Pemex might want to go as a partner in some petrochemical venture with a private company; but one source holds it's "extremely doubtful that Pemex will market any products that could not be sold in its gasoline stations."

Short on Cash: Though there's uncertainty about Pemex's willingness to join in a petrochemical venture, there's no doubt about the organization's desire to stay out of petrochemical fertilizers—considered by most as a logical first move, along with polyethylene, in a Mexican petrochemical industry. A Pemex official told *CW*: "I don't know about polyethylene, but I do know that we are going to keep out of fertilizers. For a very simple reason —lack of capital."

Foreign firms will be watched closely in any ventures into petrochemicals. Reliable sources say there would be great outcries from many segments of the population if Pemex agrees to let outside capital develop the petrochemical industry.

For U.S. concerns, encouragement comes from the realistic views of Mexican officials like Bermudez. They know their country lacks financial and technical wherewithal to adequately develop a new petrochemical industry. They know, too, that delay is costing thousands of dollars of foreign exchange per day for imports.

News about

B.F.Goodrich Chemical *raw materials*

PLUG VALVE *of Geon for handling corrosive fluids demonstrates molding of complicated shapes with integral threads. At the bearing surfaces Geon is molded to another plastic.*

LOOK WHAT THEY'RE MOLDING IN GEON RIGID VINYL...

All parts shown made by Tube Turns Plastics, Inc.

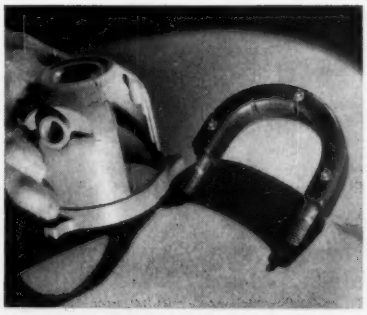
Geon polyvinyl chloride rigid compounds are recognized as outstanding materials for piping and fittings. Geon offers high impact and tensile strength, and superior resistance to oils, acids, alkalis, and most chemicals.

These same rigid compounds are being molded into many complicated shapes and parts in addition to piping components. Geon can be used in designs utilizing very thin sidewalls as well as heavy sections. Holes, studs, and threads can be made integrally. Parts weighing several pounds can be molded in one shot.

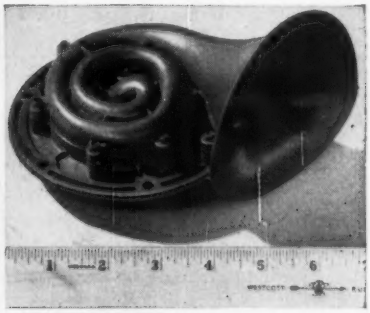
Despite design complexity, check Geon for strong, light, corrosion-resistant parts. For booklet on properties of rigid Geon compounds 8700A and 8750, write Dept. S-4, B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ont.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

BIG FELLOWS *include piping tee and motor housing, requiring heavy cross section, chemical inertness, dimensional stability. By contrast, molding for automobile dashboard has thin section, large projected area.*



ELECTRICAL PARTS *include fractional horsepower motor housing which reduces appliance weight, and hanger band for transformer with Geon molded around metal bolt. Geon has excellent dielectric properties.*



AUTO HORN *trumpet shows complicated contours possible in rigid Geon. Note very thin walls obtained in this high-impact material. Photos courtesy Tube Turns Plastics, Inc., Louisville, Ky.*

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

Like one clothier more than any other?

CHANCES ARE, you *do* have a favorite clothier. You have confidence in his ability to fit you exactly, and you know he'll treat you with special care after the sale.

Confidence has a lot to do with why people buy chlorine from Wyandotte — confidence in the quality of the product, and confidence in the sincere, deep-rooted technical service that is an integral part of the Wyandotte operation.

Frankly, Wyandotte chlorine is pampered every step of the way.

It is rigidly controlled from basic raw materials to finished product delivered to your plant. And we back it with the highest caliber technical service.

For these reasons, *we guarantee your satisfaction with Wyandotte chlorine.*

You see, we take as much pride in satisfying our customers as a custom tailor takes in satisfying his. Why not write us about *your* chlorine needs today? *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

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MICHIGAN ALKALI DIVISION

For guaranteed satisfaction, buy Wyandotte Chlorine

ADMINISTRATION

Cross-check On Competition

Chemical process industries for which the government is about to decide on setting new minimum wage rates will be quizzed about more than wage practices. Makers of drugs and medicines, in a hearing next week, and makers of soaps and detergents, paints and varnishes, and possibly industrial chemicals, who'll be up later, will also be quizzed about matters of interest to the Senate's antitrust subcommittee now probing economic concentration (*CW, Feb. 23, p. 21*).

Hearings are scheduled under the Walsh-Healey wage-setting law.

In each industry, the U.S. Labor Dept.'s Division of Public Contracts is asking representatives of management and labor to testify on "the nature and the geographic pattern of competition within this industry." Object: to determine whether the prevailing wage rate for a given industry group should be figured on an industry-wide or regional basis.

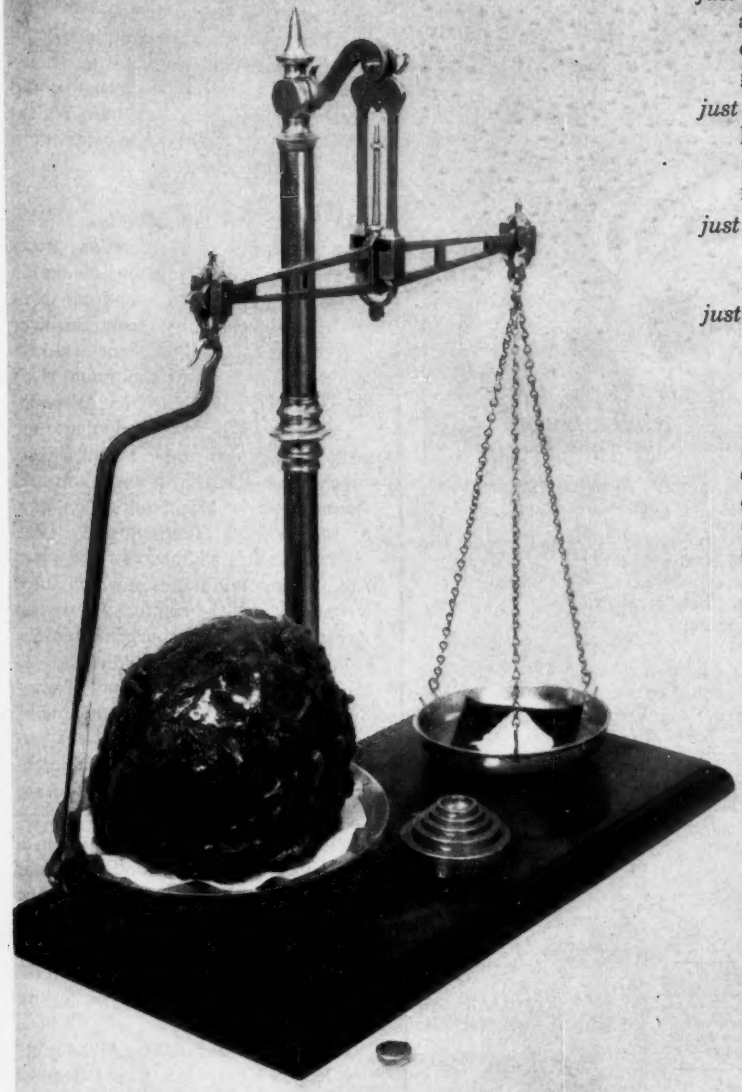
Management usually tends to prefer that the minimum wage rates for purposes of the Walsh-Healey public contracts law be set on a state-by-state basis, while labor unions generally favor a nation-wide minimum wage for each industry. But any testimony that plants in certain areas don't have to compete against producers located elsewhere might arouse the darkest suspicions on the part of the antitrust subcommittee's already-distrustful staff members.

Up From $1: While the question of continuing the industry-wide geographical classification will be debated at the drug and medicine industry hearing in Washington next Tuesday, the main issue is expected to be whether the prevailing minimum wage rate for this industry should be jacked up from the $1 level adopted last year following enactment of the latest amendment to the federal minimum wage law.

Next week's fact-finding session also will take up such questions as whether the list of products included in the definition of this industry should be revised, and whether there should continue to be below-minimum wages for learners or apprentices.

The Labor Dept. has gathered

THE THINGS YOU CAN DO WITH A LITTLE LITHIUM



just one pound of lithium hydroxide is all that's needed to make one hundred pounds of multi-purpose grease.

just one pound of finely divided metallic lithium is catalyst enough for one thousand pounds of synthetic rubber.

just one pound of metallic lithium degasifies one thousand pounds of molten copper.

just one pound of lithium hydride releases fifty cubic feet of hydrogen.

It's not so much *the things you can do with lithium* . . . as it is *how little lithium you need to do them.* Present day industrial applications require such small quantities of the metal that today's proven reserves are more than adequate to take care of all foreseeable needs. And even if lithium uses expand faster than their present amazing rate, it's reassuring to note that Foote Mineral, with the largest operating deposits in the United States, is still proving new reserves every day.

If you're interested in how a little of the right lithium chemical might go a long way in improving your operations, we'll be happy to discuss lithium chemistry with you at your convenience. Or, write now for a brief working rundown in "The Physical and Chemical Properties of Lithium Compounds" to Foote Mineral Company, 460 Eighteen West Chelten Building, Philadelphia 44, Penna.

Foote
MINERAL COMPANY

RESEARCH LABORATORIES: Berwyn, Pennsylvania.

PLANTS: Cold River, N.H.; Exton, Pa.; Kings Mountain, N.C.; Knoxville, Tenn.; Sunbright, Va.

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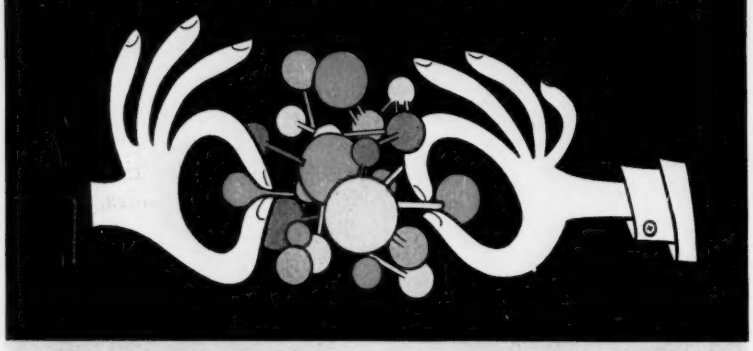
MIN CHEMISTRY *at work*

case: Sticky chemicals--and how a small quantity of M&C anti-caking agent will keep them free-flowing



Waxy, hygroscopic, sticky chemicals can clog up mills, form hard masses in plant equipment, ruin "shelf life," or make products hard to use.

Conditioner Report: M & C anti-caking agents are low-priced, neutral-colored, uniform, ultra-fine, grit-free, water-insoluble, inert materials. Through coating with these powders that stick where they're put, chemicals are "conditioned" against "tombstoning" caused by time of storage, pressure, atmosphere, temperature fluctuation, etc.

Due to light weight, high sorptivity, etc., often only 1% or less is needed for good conditioning of ammonium nitrate crystals or prills, ammonium sulfate, metallic and other soaps, resins, plastics, fertilizers, sulfur, napalm, chemicals for pest control and fire fighting, many others.

Our business is to supply nature-given materials that are *process-engineered* to make things go smooth in your plant . . . good in your markets. Use the coupon.

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I'm interested in a natural mineral product for_____

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company_____

address_____

city_____ zone_____ state_____

For more data, see Chemical Materials Catalog Pages 330-334

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ATTAPULGITE (*Attapulgus*)
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KAOLIN (*Edgar • ASPs*)
LIMESTONE (*Chemstone*)
SPEEDI-DRI FLOOR ABSORBENTS

employment and wage data for the drugs and medicines industry, and similar wage surveys are now being conducted for soap and detergents and for paint and varnish industries. In the case of industrial chemicals, a three-way panel conference—by representatives of management, labor, and government—has been held to discuss whether a 1955 wage survey could serve as the basis for a new Walsh-Healey determination, or whether a new survey is needed.

In Case of Fire . . .

An onerous public relations poser—the settlement of damage claims on the part of several thousand car owners that followed the recent fertilizer fire at the $60 million plant at South Point, Ohio—is being well handled by Allied Chemical's Nitrogen Division.

Fumes from the fire—including some oxides of nitrogen and less than 1 ppm. of chlorine—tarnished chromium and stainless steel "bright-work" on cars as far away as Huntington, W. Va., about 12 miles southeast of the plant site. Other communities in which autos were damaged: the Kentucky towns of Ashland and Catlettsburg, across the Ohio River from South Point.

At the plant site, production was out for only four days; manufacturing equipment was not damaged, but was idled until portable bagging equipment could be brought in as a temporary replacement for destroyed machinery.

Field Day for Appraisers: Within a few days after the fire, hundreds of car owners in the area were filing damage claims with their respective insurance agencies. Inspection centers were set up, with appraisers on duty for several days to check every claim on a "by appointment" basis.

Reason—Responsibility: Allied itself decided on a step that would demonstrate to the community the company's sense of responsibility. The plant management announced through local newspapers that while claims ordinarily should be filed with auto insurance agencies, uninsured car owners might telephone directly to the Allied plant to make sure their claims would not be overlooked.

In addition, Allied officials have been sitting in on conferences at which local auto dealers, insurance agents and car repair shop managers have been trying to work out settlement formulas.

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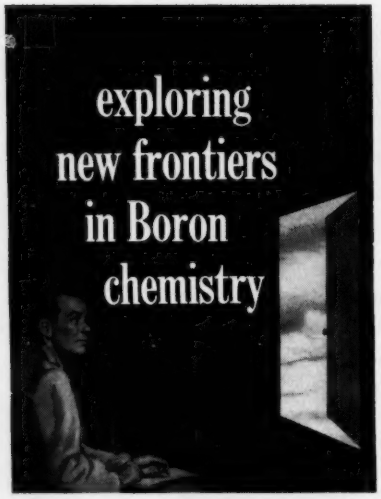

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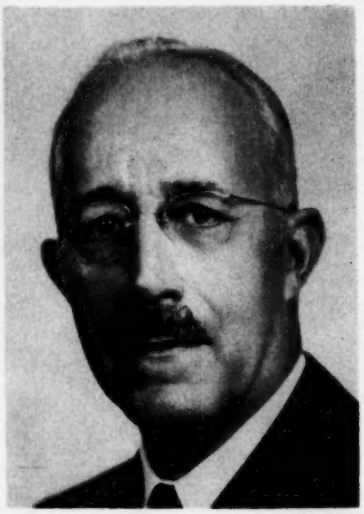

WIDE WORLD

ASPLUNDH: His firm faces new suits for alleged damage from chlorine.

LEGAL

Chlorine Gas Suit: Columbia-Southern Chemical Corp. (Pittsburgh) has been named defendant in three damage suits totaling $148,825, in connection with the escape of chlorine gas at the company's Lake Charles, La., plant last year. For company President E. T. Asplundh, these actions are the second legal problem of this kind to be faced this year. Earlier, Columbia-Southern was judged liable for automobile damages caused by chlorine gas from the company's plant at Corpus Christi, Tex. (*CW, March 16, p. 40*).

Following rupture of a chlorine tank at Lake Charles, the first suit was filed by a West Lake couple asking $19,650. A second suit for a total of $111,700 was filed by six couples, and another couple filed the third suit for $16,475.

The plaintiffs allege they were hospitalized by chlorine poisoning and that several lost time from work.

•

Exports to Communists: The U.S. Dept. of Commerce has denied export privileges to eleven concerns and individuals in England, Canada and the U.S. for the illegal transhipment of $1.3 million worth of U.S. goods to Communist-dominated countries.

The order named William Wallersteiner and his trading companies: Watford Chemical Co., Ltd. and E. Tingley & Son, Ltd., both of London; Watford Chemical Co., Ltd., Toronto, Can.; and Watford Chemical Corp., New York.

The Commerce Dept.'s Bureau of Foreign Commerce said that in 1951 Wallersteiner, operating through a Swiss corporation under his control, contracted with a company in East Germany to supply it with chemicals. drugs and dyestuffs. The East German concern was a known purchaser for the Communist China Export Corp., the bureau said.

It also reports that the Wallersteiner group obtained some of the materials in the U.S. "by falsely representing to U.S. suppliers, to BFC and to U.S. Customs that shipments were ultimately destined for purchasers in England or Canada."

IDEAS

Neighborly Greetings: Aiming to generate good-will on the part of townspeople in its new plant community, Callery Chemical Co. invited everyone in the town of Muskogee, Okla., to attend ground-breaking ceremonies at the site where Callery will produce high-energy fuels for the U.S. Navy. In advertisements in local newspapers, Callery offered free bus service from the Muskogee city hall to the grounds where construction is getting under way on its $38-million plant. Production won't start for "a couple of years" yet, but Callery assured residents and prospective job applicants it wanted to meet them at the groundbreaking.

•

Novel Reports: Pfizer, through its use of newspaper-supplement annual reports, is not the only chemical process concern using "different" techniques for reporting 1956 earnings (*CW Business Newsletter, March 23*). Monsanto has mailed out its annual statements in two editions: one heavy on charts and statistics, the other featuring pictures and a more simplified presentation designed to be more readable for stockholders who don't want to wade through a maze of financial details. And in 23 Midwestern cities, Standard Oil Co. (Indiana) is using a telephonic answering device called "Amanda" to give operating results to its employees. In each of those cities, Standard's local manager has recorded a one-minute message reporting on the company's increased sales but lower net earnings; employees can hear this recorded message by dialing a certain number.

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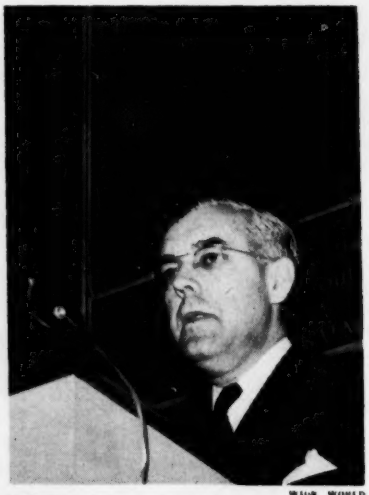


WIDE WORLD

BOSTON'S CANHAM: His council asks better use of U.S. womanpower.

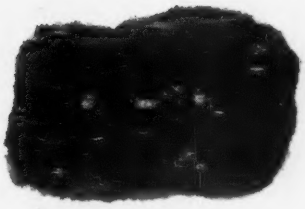
LABOR

More Reliance on Women: Shortly after the chemical process industries got a specific warning from a U.S. Labor Dept. spokesman about a probable manpower shortage by 1965, the National Manpower Council appealed to employers to develop new methods, such as use of part-time and flexible work schedules, for more efficient utilization of the nation's womanpower. Council Chairman Erwin Canham brought to President Eisenhower—who had organized the council while he was president of Columbia University—a report urging that the government conduct extensive surveys on maximum potential use of women in the work force. The report also recommends that more training and other vocational services be offered to women who could help meet employment demands in professional and semi-professional occupations.

•

ESA Union Disaffiliates: Denoting a possible swing on the part of salaried-employee unions toward increased collaboration with wage-earner unions, one of the charter member groups within the Engineers & Scientists of America has pulled out of ESA in favor of affiliating with Walter Reuther's United Auto Workers (AFL-CIO). The defecting union is the Federation of Honeywell Engineers, whose delegates to last year's ESA convention led an unsuccessful drive for ESA approval of alliances with AFL-CIO. Winner in that fight was ESA's so-

COAL



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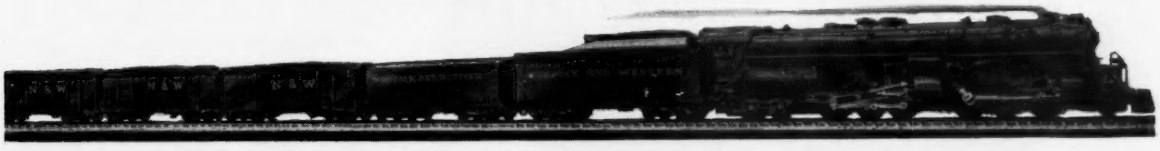

Yesterday, coal was used mainly for heat and power.

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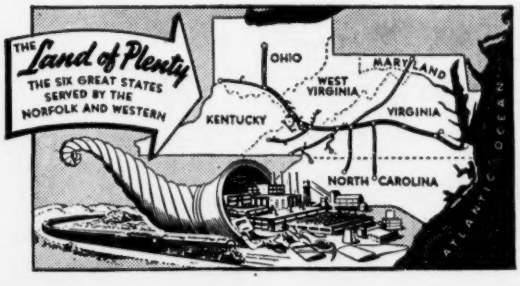

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specific gravity	● .892 — .896 at 20°/20° C.
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Typical reactions of TRIETHYL ORTHOFORMATE

$HC(OC_2H_5)_3 + ROH$ (Alcohol) ➡ $HC(OR)_3 + 3C_2H_5OH$ (Trialkyl (Aralkyl) Orthoformate)

$HC(OC_2H_5)_3 + RR'C=O$ (Carbonyl Compound) ➡ $RR'C(OC_2H_5)_2 + HCOOC_2H_5$ (Acetal or Ketal)

$HC(OC_2H_5)_3 + CH_2(CN)_2$ (Malononitrile) ➡ $C_2H_5OCH=C(CN)_2 + 2C_2H_5OH$ (Ethoxymethylene Malononitrile)

$HC(OC_2H_5)_3 + CH_3CBrHCOOR + H_2$ (Alpha-Brom-Propionic Ester) ➡ $(C_2H_5O)_2CHCH(CH_3)COOR + C_2H_5OH + HBr$ (Acetal of Formyl-Propionic Ester)

$HC(OC_2H_5)_3 + C_6H_5COCH_3$ (Acetophenone) ➡ $C_6H_5COC_3H_7 + HCOOC_2H_5 + C_2H_5OH$ (Phenyl Propyl Ketone)

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ADMINISTRATION

called "professionalism" faction, which opposes wholesale inclusion of non-professional-grade employees in bargaining units that represent engineers and scientists.

One factor behind the Honeywell engineers' 579-to-116 decision to go into UAW's Aircraft Division: in the engineers' 1955 strike, their picket lines were ignored by the production and maintenance workers.

•

Dual-purpose Strike: There's industry speculation that the current oil marketing strike by Oil, Chemical & Atomic Workers Union (AFL-CIO) members in the Detroit area may have had a secondary objective: making an impression on Wyandotte Chemical workers. At any rate, OCAW won last week's election in that firm's Michigan Alkali division by 1,106 to 840 votes; but lost by 137 to 140 in the J. B. Ford division. The Michigan Alkali victory was OCAW's biggest representation triumph since the union was formed by merger two years ago. And it was the biggest recent setback for the union that held sway there for the past 15 years. As members of District 50, United Mine Workers, the Wyandotte plant workers waged a costly, 12-week strike early in 1955, and had been involved in a dozen wildcat stoppages in the year and a half that preceded the 3-month strike.

KEY CHANGES

George Mast, to vice-president, and director of new product development, Warner-Chilcott Laboratories, a division of Warner-Lambert Pharmaceutical Co. (Morris Plains, N.J.).

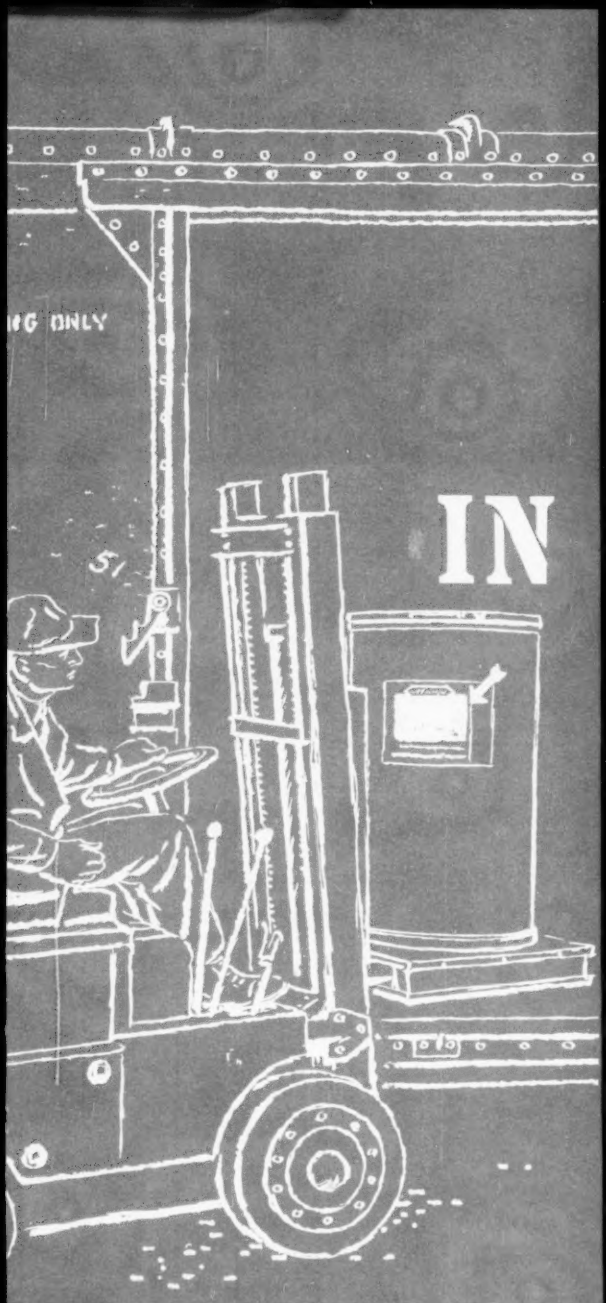
Valentine B. Chamberlain, Jr., to sales manager, Stanley Chemical Co. (East Berlin, Conn.).

R. S. Abrams, to manager of production and engineering, Silicones Division, Union Carbide and Carbon Corp.

Harold J. Rose, to asst. general manager, Chemical Products Dept., Esso Standard Oil Co.

William A. Mitchell, to director, National Starch Products (New York).

John M. Gaston, Jr., to director, Legal Dept., Allied Chemical & Dye Corp.



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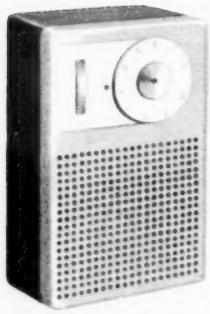

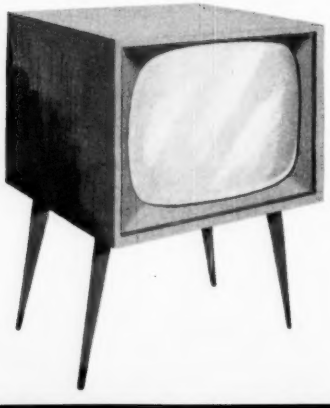

Mercury Salts have varied uses

Mercuric oxide is used as a depolarizer in batteries and as a pigment in ceramics and marine paints. *Mercuric chloride* is used as a depolarizing agent in mercury batteries. In the manufacture of polyvinyl chloride, it is used as a polymerization catalyst. It is also used in the treatment of seed potatoes. *Mercurous chloride* serves as an electrolyte in batteries.

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Zinc stearate is used as an internal and external lubricant in plastics and is also an efficient flatting agent in lacquers. *Calcium stearate* is used as a lubricant and stabilizer in plastics and also improves the plasticity of starch-clay coated papers. Gelling characteristics of Mallinckrodt *aluminum stearates* are important in the manufacture of greases. In paints they create a gel structure strong enough for pigment suspension—without making the paints too thick for easy application. The unique and diverse properties of these and other stearates are being continuously utilized in new developments throughout industry. If you have a possible application, call us for technical assistance.

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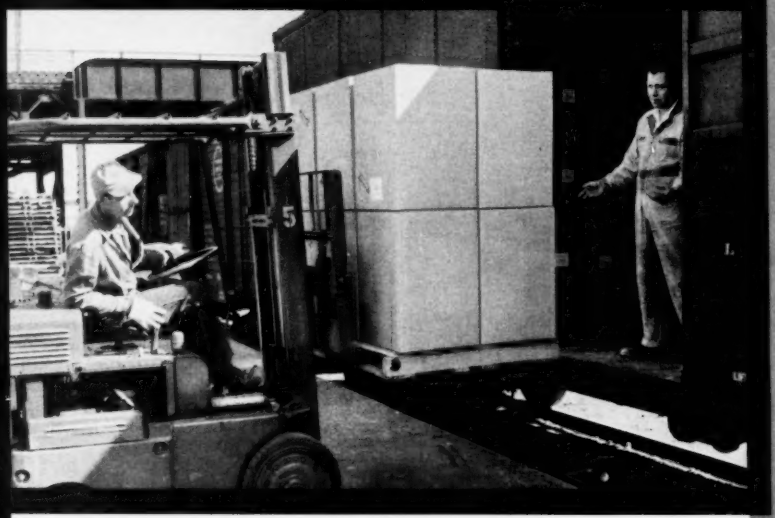

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GREEN PASTURES: Setting of DDT tolerance on meat fat means . . .

New Market for Pesticides

The Food and Drug Administration has at last come to grips with the problem of pesticide residues in meat and on forage crops. In the past few days, residue limits, as required by the Miller Amendment, have been asked for toxaphene (in meat fat) and for endrin and dieldrin (in meat fat and on forage feed crops).

Already, a 7 ppm. residue limit for DDT in beef, lamb and pork fat has been established. And its issuance last month gave manufacturers the encouragement needed to spur application for other tolerances.

Defining the Problem: Until a short time ago, FDA was highly reluctant to deal with the subject of residues tolerances in meat fat and forage crops at all. This wariness stemmed from the fact that FDA really didn't know what sort of a residue problem it faced.

Now, however, the work done by the U.S. Dept. of Agriculture at Kerrville, Tex., on the amount of insecticide residues on meat fat and milk has given FDA something to go by.* And, unless there are unforeseen problems, approval of the new applications shouldn't be too long in coming if FDA accepts as adequate the evidence pesticide makers have accumulated by testing their products along lines prescribed by the USDA and FDA.

The new forage and meat applications, which should be the vanguard of a host of items for residue tolerances for fats and forages, represent only part of stepped-up activity at FDA. Late in February, there was a big upsurge in requests for tolerances, the 3-5 requests usually expected each month climbing to almost a dozen.

Of the 114 applications received, FDA has set tolerances on 56, as of March 1 of this year—not including zero tolerances or exemptions. Some 16 applications have been withdrawn.

FDA told *CW* it understood fully the need for pesticides to overcome the heavy damage visited upon forage crops by pests such as grasshoppers, spittle bugs, aphids, had never any intention of trying to prevent their use. With the yardstick it obtained from the work at Kerrville, the FDA now is able to pass on products it has heretofore been reluctant to consider.

*ARS-33-25, July, 1956, by H. Y. Clayborn, Entomology Research Branch, USDA.

Tougher Silicone

At last week's Conference on Elastomers for Air Weapons at Dayton, O., attendees got first peek at a new elastomer developed by the Silicone Products Dept. of General Electric.

The product: GE's 81716 silicone rubber which combines the physical strength typical of organic rubbers with the extreme temperature resistance of silicone. Introduction of GE 81716 follows hard on the heels of Dow Corning's recent display of its similar Silastic 916 (*CW Technology Newsletter, March 23*).

The new GE material, brainchild of Joseph C. Caprino, has a tensile strength in the range of 1500-1800 p.s.i.; tear strength in the range of 180-225 p.s.i. Shore A hardness is approximately 51, and elongation ranges from 600 to 750%. Compression set is 60%. (Most of these figures are for 3 hour, 400 F cures.) Specs on Silastic 916 are approximately the same, except for elongation (500%) and compression set (about 30%). Both materials have very low water absorption characteristics.

Currently, these two new high-strength compounds are the only ones available to fabricators of rubber components for airframes that meet AMS 3345 requirements for elongation, tensile and tear strength, dry heat resistance, compression set and low temperature flexibility. Though 81716 also meets AMS 3345 values in three or four oil-resistance specifications, it is somewhat marginal in the fourth, i.e., strength after 70 hours' immersion in lubricating oil at 300 F. But, says GE, because 81716 has an unusually high original tensile strength, it matches most silicone rubbers in strength even after oil exposure.

Like the Dow Corning product, 81716 is available in limited quantities for evaluation, and is supplied either with or without a catalyst. It may be cured by a variety of oven, hot air, or steam vulcanization processes. Price: approximately $5/lb.

Market for both the new silicone elastomers is expected to be almost 100% military at first—in such applications as diaphragms, boots, bellows, in forming blankets and seals for firewalls, in bomb bay doors and hatches.

Needed: More Facts on Farm Chemicals

If the agricultural chemical industry wants to continue to grow, it's going to have to make a careful effort to bring its selling expenses, inventories, and accounts-receivable policies a little more into line with the rest of industry.

That's the gist of what Pennsalt of Washington's Fred Shanaman told the 250-plus registrants gathered for the National Agricultural Chemical Assn.'s Spring meeting in San Francisco's Fairmont Hotel.

Shanaman, using figures and charts that one delegate termed "by themselves worth the price of admission", demonstrated that "a commitment to do better in the area of return on the dollars employed is essential."

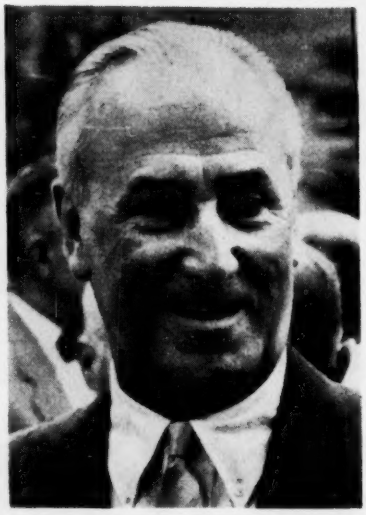
The essential statistical points Shanaman made:

- Return on investment (before taxes) to ag chem firms averages 5% on initial investment, 6% on depreciated investment, where the comparable figures for the chemical industry as a whole are 15% and 21%. This is due, Shanaman believes, to the ag chemical maker's somewhat unusual balance sheet.
- Where industry as a whole shows current assets averaging 51-56% of total assets, farm chemical makers generally find 73% of their total assets made up of current assets.
- Agricultural chemical makers, too, have 14% of net sales in receivables (20% of total assets), compared to industry's 10%.
- Some 20% of farm chemical makers' total assets are in receivables, compared to a 12-15% industry average.
- Inventory of the farm chemical manufacturers is often 45% of the cost of sales—where 19% is the average for industry.

Significance: If a chemical company with average figures for industry were to diversify into pesticides until these reached 25% of sales, its hypothetical profit would be reduced from 15% to 13.25%; its pre-tax return on capital, from 15.2% to 12.55%.

Facts for Figures? Although Shanaman's data was impressive, he felt called upon to apologize for his figures on grounds that the ag chemical industry's available facts and figures aren't up to snuff:

"If we attempt to compare ourselves with . . . other segments of the chemical industry, we must admit our complete immaturity in the way of statistical data. . . . It is hard to decide whether we are suspicious of one another, do not keep records and hate to admit it, or just do not believe in the disclosure of basic facts and figures to the extent practiced by other industries. . . . This great data famine makes it extremely difficult, . . . almost impossible, to prepare a factual talk" on the agricultural chemical industry.



SHANAMAN: To aid industry growth, more data is needed.

NACA's president, Fred Hatch*, first on the rostrum, had sounded the pitch for the speeches to come when he bemoaned an "absolutely appalling . . . lack of accurate statistical data." Citing this lack as holding back profits, Hatch said that with better data helping out in more aggressive selling, sales of pesticides to non-agricultural markets alone (*i.e.*, forest, turf, home garden; railway, power line and highway brush control; rodent and weed control around industrial and military installations) could easily reach $50 million in the next five years.

Round-Up: A major report from the U.S. Dept. of Agriculture on the Miller Amendment to the 1938 Food, Drug and Cosmetic Act and earlier laws will be published within a month. USDA's John Coyne reported that the review will list crop or animal treated, tolerances, largest single doses, limitations, etc., for insecticide registration matters USDA has covered in the last nine months. In that time, over 4,500 labels from more than 200 companies were processed.

Coyne said that 70-75% of the users now registered under the 1948 Federal Insecticide Act meet the requirements of the newer Miller Act. Most of the labels still in doubt concern direct application to animals or forage crops (*see also p. 43*)—primarily where there's a possibility of milk contamination. But the USDA will not act immediately to cancel the label registration for the 1,000 products whose formulation or base pesticide doesn't comply with the Miller Act.

Room for Doubt: Whether the temptation of better chances at future markets, and of brightening the profit-cost picture of their industry can pursuade the farm chemical makers to part with figures can not be determined surely from the reception the call for such data received. It's been sought in the past, but seldom provided.

*Manager, Agricultural Chemicals Division, Shell Chemical Corp.

PRODUCTS

On the Nose: Valve Corporation of America (Bridgeport, Conn.) is marketing what it calls "the first aerosol applicator specifically designed for a nasal spray." The purse- or pocket-sized bottle has a metered valve which can deliver doses from 50 mg. on up. The spray is now being used by several medical laboratories for their cold-treatment remedies.

•

Sensitive Silicone: Mystik Adhesive Products, Inc. (Chicago) has introduced a pressure-sensitive aluminum foil tape with a silicone adhesive. The company reports this major advantage: effectiveness over a wide temperature range, from —100 F to 550 F (in some applications, the firm says, it has performed satisfactorily up to 1,000 F).

•

Swimming Pool Patch: For repairing leaks in vinyl plastic pools, toys and rainwear, R. M. Hollingshead Corp.

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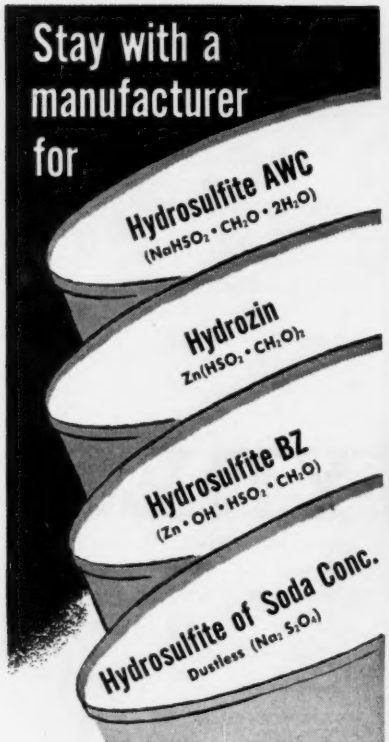

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has developed a liquid plastic repair material called DAB. The product seals punctures permanently with a penetrating chemical action similar to a weld, the company says. DAB is a consumer adaptation of the Cocoon formula developed some years ago as a protective coating for machinery and for mothballing ships. It will go on sale this month; a 2-oz. bottle will sell for 69¢.

•

Add Two: Olin Mathieson is marketing two new additives for improving viscosity index of lubricating oil. The products are claimed to be particularly good in resisting shear breakdown. The company says the materials raise the viscosity index, but thicken the oil less than similar products. At the same time, they lower the pour point to —30 and to —50 F (ASTM). These two additives, Omavis 10 and 20, initiate a new series.

•

Dust Chaser: Dust-Off, an aerosol designed to remove static electricity, is being sold by Ade-O-Matic Co. (Chicago). Sprayed on furniture, it is designed to repel dust.

•

Polymer Is Starred; O-Cedar Division of American-Marietta Co. (Chicago) has a new floor polish called Foot-Note* (purposely spelled with the asterisk). It contains a synthetic polymer which the company calls Poly-Sheen. Claimed for the polish: a hard, brilliant finish, water resistance, no discoloration of floors. The firm says that, though the wax is more costly ($1.59/quart), it is more economical to use than other waxes because of the long-lasting qualities of its finish.

•

Gibberellin Growth: Another new plant growth formulation incorporating gibberellic acid has joined the flood of materials now on the market. This one, called Brellin, is a water-soluble powder, made by S. B. Penick & Co. (New York). When one level teaspoon (2.5 grams) of Brellin is dissolved in one pint of water, a solution containing 10 parts/million of gibberellic acid is produced.

•

Teflon Tape: Chemo-Plastics Div. of Chemo-Textiles (West Warwick, R.I.) has added Teflon tape to its line of insulating materials. Tape is available in colors and natural white.

Filling Machine: Hope Machine Co. (Philadelphia) has introduced what it describes as the first high-speed, heavy-duty filling machine for packing fiber cartridges with grease and such specialties as caulking or roofing cement, buffing compound and similar viscous material. The unit, called the Type 27 Cartridge Filler, can handle 70 to 100 2″ x 8½″ cartridges during each minute of operation.

•

Paint-on Solder: Flux 'N Solder is the tradename for a series of compounds of finely powdered solder suspended in an active flux. The material is painted on, and then heated to seal the joint. A product of the Johnson Manufacturing Co. (Mount Vernon, Iowa), the new paste is packed in 1-lb. cans that is slated to sell for $2.50.

•

Aerosol Troubleshooter: Arco Electronic (Los Angeles) has come up with a method of detecting defects in electronic circuits caused by thermal changes. A spray of fluorocarbon refrigerant is applied to the suspected area until frost forms on the part. If the circuit then begins to operate satisfactorily and continues to do so until after the frost melts, it indicates that the sprayed part is likely to be the source of trouble. The portable chiller, called Jiffy Zero, sells for $2.75 for a 6-oz. can.

•

Rubber Caulking: The Building Products Division of L. Sonneborn Sons (New York) has developed a synthetic rubber caulking and sealing compound. Called Sonolastic Sealing Compound, it's a liquid made up of sulfurized rubber polymers plus an activating agent. The compound is sold in 10- and 2½-lb. units, comprised of both base and activator. The 10-lb. unit, available in neutral tan, black, aluminum and gray, will fill a 200-cu.in. volume.

•

All-Use Wax: A new liquid cleaner that washes, waxes and protects in one operation, intended for use on automobiles, kitchen appliances and all painted, plastic, porcelain or metal surfaces, has been introduced by Seco Chemicals (Detroit). Called Glitter Wash, the product combines carnauba wax and a neutral detergent. A 16-oz. can will retail for $1.49.

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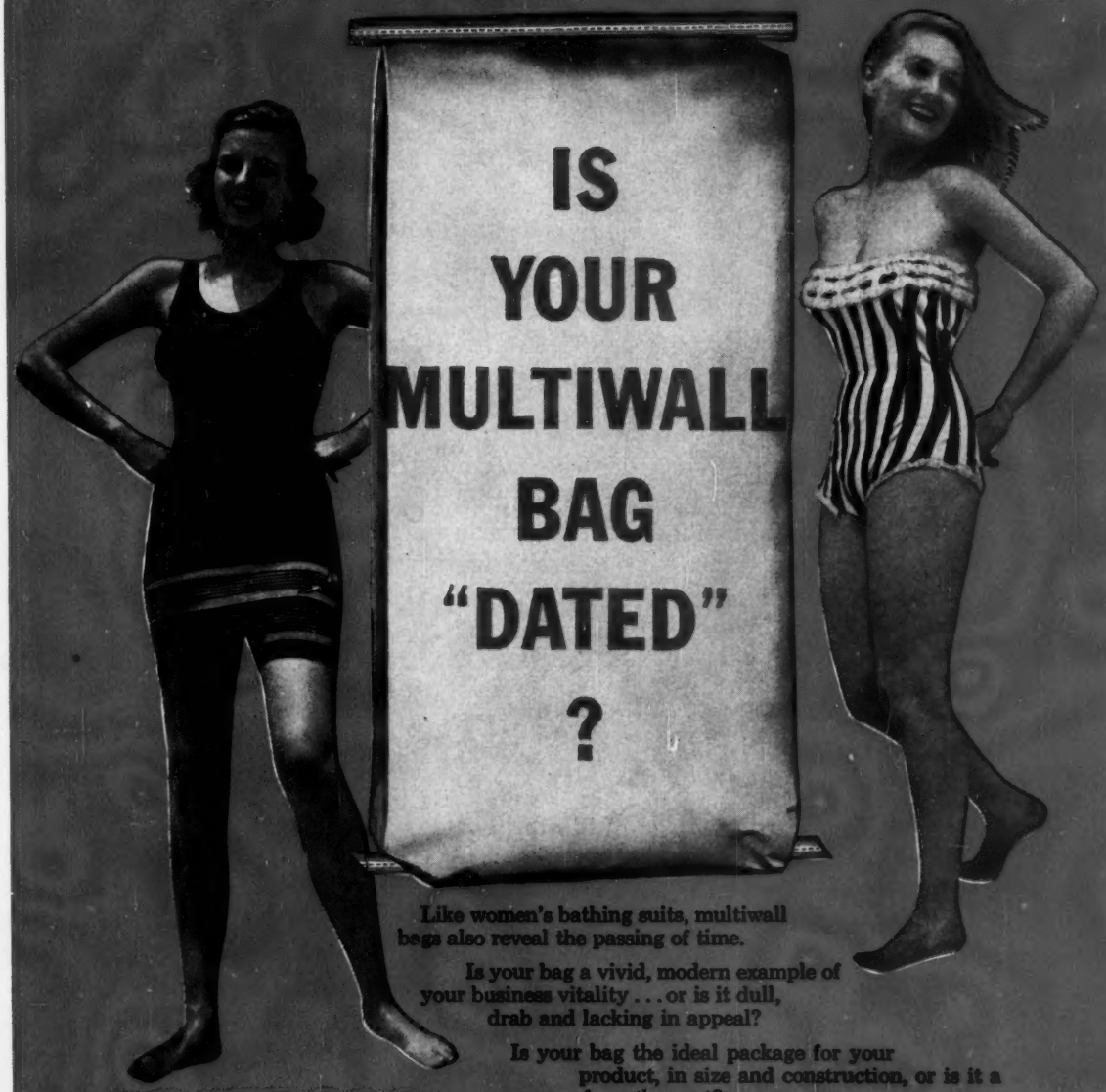

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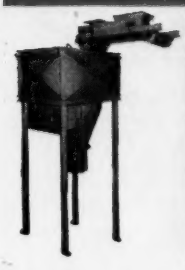

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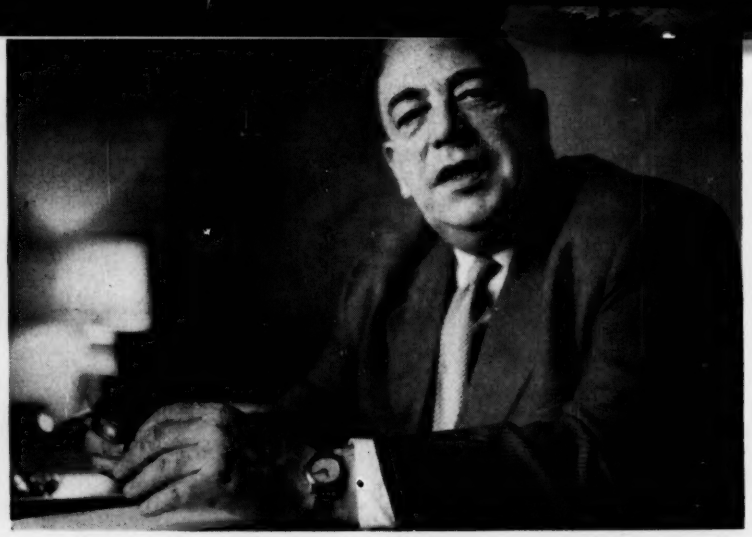
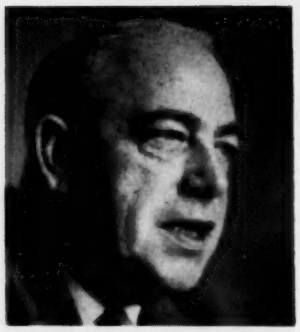
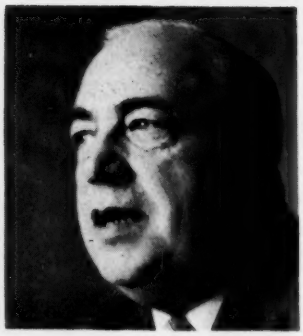


"Research people tackle the day-to-day problems of their production colleagues with enthusiasm . . . once they understand the importance of these problems."



"It's essential to provide parallel ladders of promotion both as regards salary and status for researchers . . . other staffers."



"There are rewards in the thrill of being closely associated with . . . a new product that benefits . . . the human race."

"Bring Research Back to the Plant"

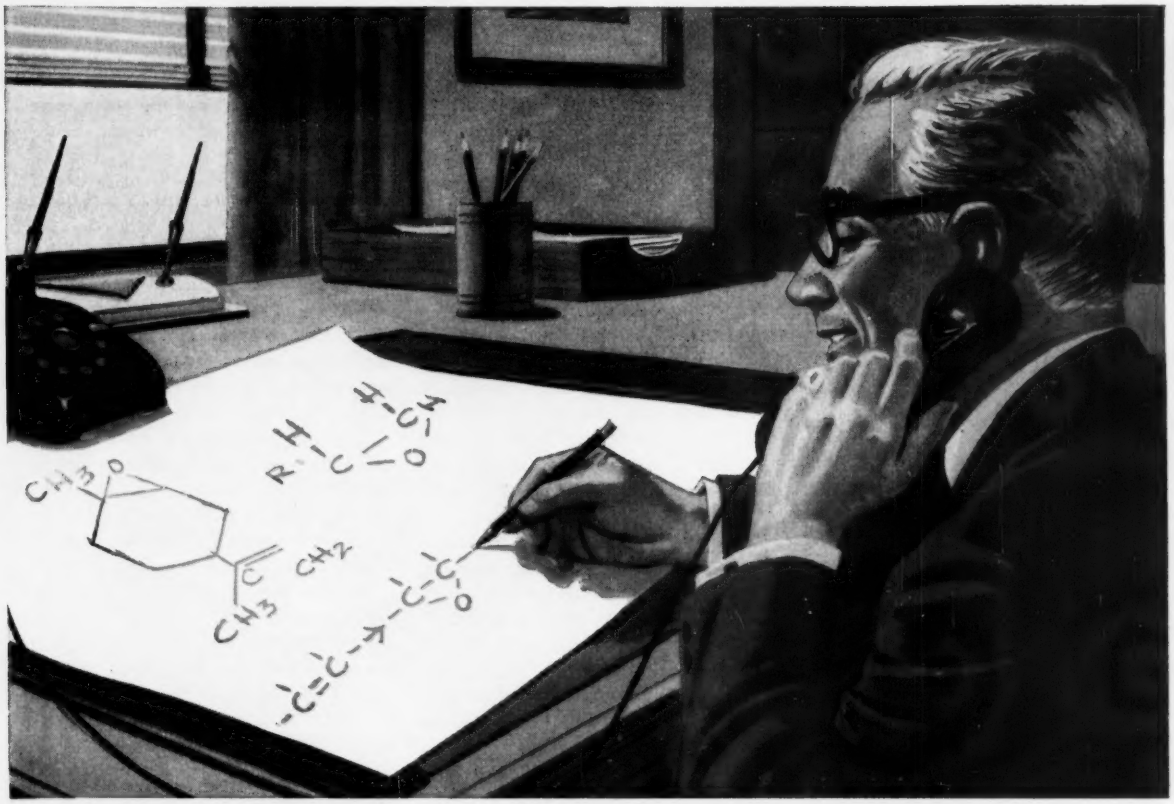
A bucolic setting for industrial research holds no charm for Ronald Holroyd, deputy chairman of England's Imperial Chemical Industries. Recently, in New York's Biltmore Hotel, he cautioned the American Section, Society of Chemical Industry, that the trend toward locating laboratories in isolated spots away from manufacturing facilities can hurt researcher efficiency.

The soft-spoken executive's views will come as no surprise to ICI staffers. Most of the firm's thirteen divisions have individual research, development and design organizations that work closely with manufacturing. No attempt is made to keep researchers from exposure to day-to-day production problems.

Holroyd, formerly ICI's research director, finds this arrangement practical for his company because, among other reasons, "there is no geographical bar to close contact between research and other functions."

Holroyd's idea would be considered old-fashioned by many American research executives, who believe that researchers should be kept apart from the madding industrial crowd.

Many chemical companies in the U.S. are looking for, or have found, suburban locations for their research laboratories. Their premise: researchers



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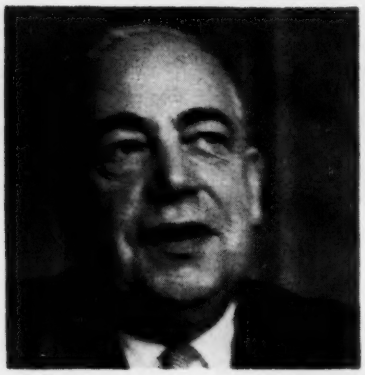
"The presence of researchers in top management encourages scientific brains to enter industry."



"Don't allow research administrators to be 'bullied' by production people."

"Apologetic inducements emphasize . . . the idea that the industrial research worker is not of industry."

shouldn't become embroiled in quality control and similar tasks that can interfere with the job of turning up new ideas and products. Moreover, such sites offer better living conditions, help attract personnel.

Holroyd considers this an "apologetic" approach, thinks ICI's method is more "positive". The proximity of researchers to their colleagues in other functions, he feels, gives the former "the stimulus of being a member of a vigorous team working toward a worthwhile end, and the thrill of being closely associated with making available a new product which benefits the health, comfort or living standards of the human race."

There's a big satisfaction to the research man, Holroyd avers, in being able to take his friends into the plant, saying, in effect, "I worked on that. If it hadn't been for me, no such product would exist today."

At ICI, researchers are deliberately encouraged to obtain practical experience in plant work other than research —even when their abilities clearly point to research careers. "I, myself," reveals Holroyd, "have left and returned to research no less than four times." While admitting that this policy is difficult to promote—"research departments are loath to release promising men because they suspect, often quite rightly in the early stages, that they will not return"—Holroyd says the benefits justify any inconveniences.

An important advantage is that high-grade scientists get the opportunity to acquire experience in a broad range of industrial subjects. That's better, Holroyd thinks, than offering "academic inducements such as maximum freedom to publish, sabbatical years in universities, or permission to spend part of the time on private research not necessarily of company interest." This approach he considers "apologetic" because it "emphasizes the idea that the industrial research worker, while in industry, is seldom *of* it."

The articulate Holroyd is convinced that moving the research staff about increases his firm's research speed and efficiency. "Research people tackle the day-to-day problems of their production colleagues with much greater enthusiasm once they can understand through their own experience the importance of these problems."

Keeping research close to the plant pays off in other ways, too, he adds. "It ensures that maximum use is made of research facilities in the technological development of a project. Semi-technological or pilot-plant scale investigations are extremely expensive and this more or less empirical approach should only be used when really necessary and then only to the minimum extent possible."

To critics of ICI's type of research organization, who charge that long-term work suffers under the demands of every-day problems, Holroyd answers, "I don't think research gets bogged down by being in the center of production as long as management is aware of the problem, doesn't allow research administrators to be 'bullied' by production people. Of course, research directors must have adequate status."

There's plenty of evidence that this philosophy is both in force and proving profitable at ICI, whose sales last year totted up to about $960 million ($36.4 million of which went for research). Of nineteen executive directors currently on the main board of the company, five have held positions as divisional research directors and another five boast considerable research experience early in their careers.

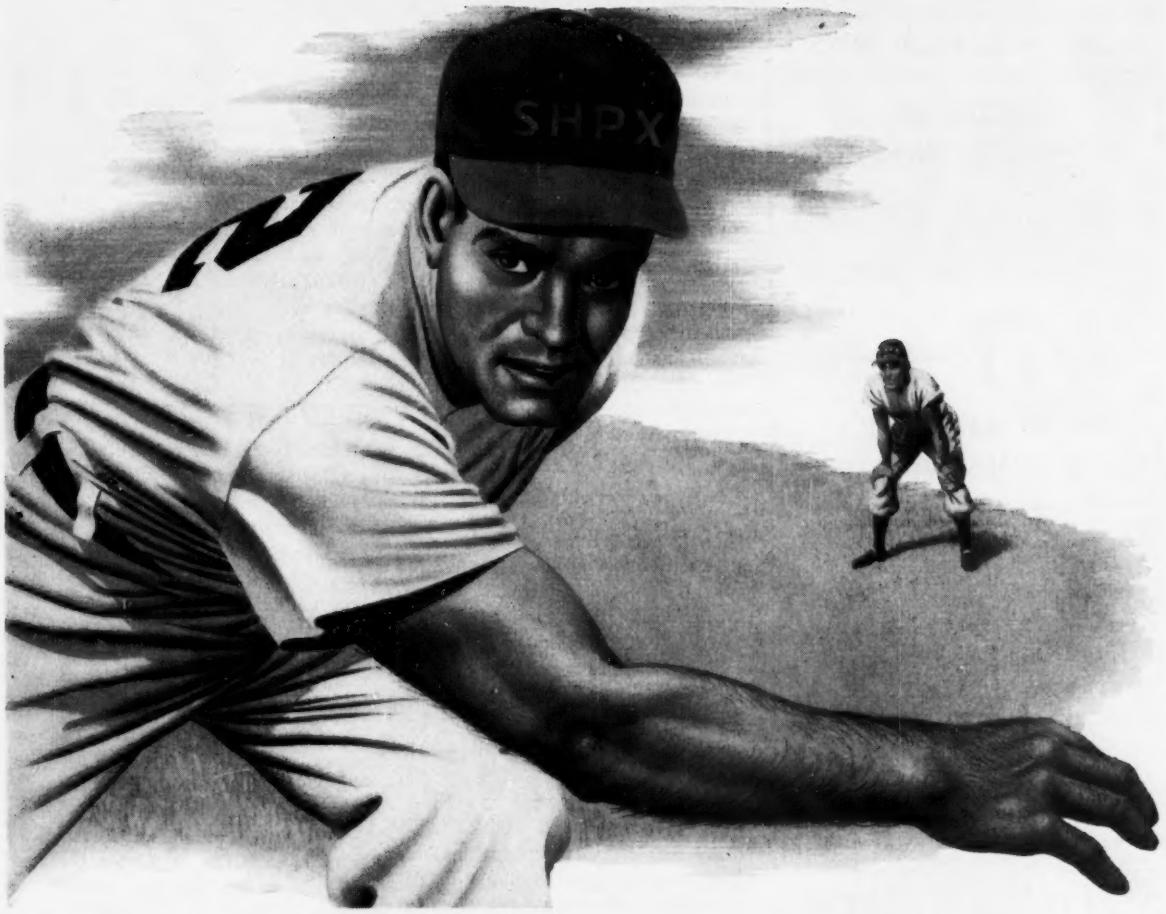
Holroyd considers this "most important, both as encouragement for the best scientific brains to enter industry, and from the standpoint of ensuring a top management with a proper understanding of the difficulties and possibilities of research."

"For such a policy of extensive staff movement to be effective," Holroyd points out, "it is, of course, essential to provide parallel ladders of promotion both as regards status and salary in the various technical departments. Without this, it is not possible to effect satisfactory side-stepping moves between, say, research, development, and production.

"Organization of research depart-

Speaking from Experience

Holroyd joined ICI in 1928 at Winnington (where polyethylene was discovered), became Billingham Division research director in 1947, was appointed to the firm's main board in November '52, as research director. He was appointed deputy chairman, Jan. 1, '57.



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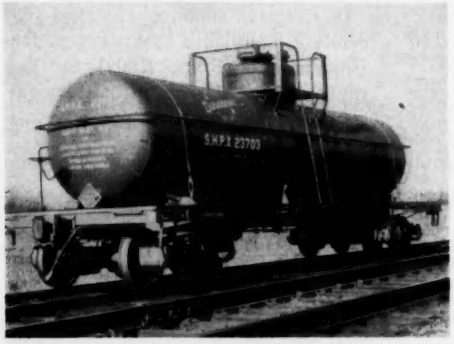

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RESEARCH

ments by product fields helps in this connection, since the heads of these groups correspond much more closely to the heads of, say, development or production groups than would the heads of research sections organized on a functional basis."

There's clearly no one best way to do research. Methods vary with a firm's size, location, etc. But Holroyd's positive views merit the attention of all thoughtful research executives, even though their particular company's problems may be considerably different from ICI's.

PRODUCTS

Radiochemicals: D-Mannose, with an activity of 20 millicuries per millimole, is now available from Nuclear-Chicago Corp. (Chicago). It's for use in metabolism, photosynthesis and physiological studies of sugar systems.

• Schwartz Laboratories, Inc. (Mount Vernon, N.Y.) now offers many of its radiochemicals in solution form.

•

Diisocyanate Entry: Named Nacconate 310, dimethyldiphenylmethane diisocyanate is now available in developmental quantities from National Aniline Division, Allied Chemical & Dye Corp. The newcomer is reportedly unique in that it forms relatively stable water emulsions, has an unusually low reaction rate and low vapor pressure.

•

Isatoic Anhydride: Maumee Chemeical Co. (Toledo) reports it has developed a commercial process for making isatoic anhydride, will supply any quantity. A typical reaction is with primary alcohols at low temperature to yield anthranilate esters, used in flavors and perfumes.

•

Analytical Aids: A new reagent for detection and determination of sodium ions is offered by Monroe Chemical Co. (Rockland, Mass.). It consists of a ready-to-use solution of a buffered aqueous-alcoholic preparation of α-methoxyphenylacetic acid, which, in the presence of the sodium ion, deposits an insoluble sodium salt. The newcomer is said to be the first reagent to make possible a simple and reliable sodium ion analysis in the presence of a variety of other contaminating ions. Tests can reportedly be performed in the presence of large amounts of ammonium, lithium, magnesium, potassium and rubidium salts, and in the presence of such common anions as the chloride, nitrate and phosphate.

• Fisher Scientific Co. (Pittsburgh) is out with a high-purity sodium tetraphenylboron for potassium determinations. Price: about $6.35/10 grams; $14.15/25 grams; $49.60/100 grams.

EXPANSION

• General Electric Co.'s Silicone Products Dept. (Waterford, N.Y.) is building a new product and process development laboratory that it expects to have ready for occupancy in Jan. '58. The lab is part of a $3-million capital outlay planned for the Waterford plant during '57, will double existing research space and, reportedly, be fully equipped for study of "all aspects of silicone chemistry." However, GE's research laboratory at The Knolls (Schenectady, N.Y.) will continue fundamental silicone research.

• A new $500,000 expansion program is expected to double the size of Babcock & Wilcox's nuclear research facilities in Campbell County, Virginia. It's the second major expansion of the lab in less than a year.

• Kelco Co. (San Diego), manufacturer of algin products from seaweed, is constructing a $250,000 research laboratory.

• Colgate-Palmolive Co. has recently established a laboratory at the University of Rome (Italy) for the study of the relationship of chemical constitution to the properties of matter.

APPARATUS

Time-Saver: A new chromatographic refractometer that performs chromatographic analyses unattended, once tests have been started, is available from Phoenix Precision Instrument Co. (Philadelphia). Designed for continuous operation, it takes 115 volts at 60 cycles.

•

Radiation Check: Nuclear Measurements Corp. (Indianapolis) is offering a new portable radiation survey meter —model GS-3W—for use in industrial, medical and research laboratories.

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In Canada: Naugatuck Chemicals Division of Dominion Rubber Company, Ltd.

In Europe: Atlantic Chemicals SAB, Antwerp, Belgium

In South America: Atlantic Refining Company of Brazil, Rio de Janeiro

Technology
Newsletter

CHEMICAL WEEK
March 30, 1957

And now it's polycarbonates that have the polymer world buzzing.

Since last fall, word of big polycarbonate activities has been trickling through from Germany. (Bayer has done considerable work on them since 1953 at its Uerdingen plant.) Now there are indications that American interest is at the fever point.

Colorless and transparent, polycarbonates possess good electrical and mechanical properties. They are potentially important as the basis for new films, fibers, protective coatings.

Other facts: they melt between 150 and 300 C (depending on the type), have low gas permeability and in general exhibit excellent resistance to acids and strong oxidizing agents. Resistance to strong alkalis, ammonia and amines, however, is limited.

Bayer has made some thirty-odd different polycarbonates. It has a pilot plant in operation, is frankly bullish about prospects of eventual large-scale production of some members.

But the chemistry is a bit tricky and the term, "polycarbonates," is apt to be confusing.

First step in the synthesis is the formation of a 4,4′-dioxydiphenyl alkane. This is made from a ketone and phenol (or phenol derivatives). If, for instance, phenol is reacted with acetone, bis-phenol results.

The diphenyl derivative is treated with phosgene or dialkyl carbonates to form the polycarbonates.

•

Some potentially significant fluorochemical research results are starting to emerge from Birmingham University (England).

Birmingham researchers have, for instance, replaced the hydrogen in benzene with fluorine, come up with products possessing intriguing properties. They are now working on non-flammable anesthetics and new drugs. So far, the university has had trouble getting funds to make its products in quantities large enough for a valid commercial appraisal. There's some hope, however, that the British government (which has been subsidizing the research) may ante-up funds for piloting.

•

A crash research program to uncover chemical cures for cancer? That's possible if the government grants a proposed $5-10 million subsidy.

The whole project is still in a very early stage. But ten drug and chemical producers have (at the request of the National Cancer Institute of U. S. Public Health Service) estimated that they'd need $5.2

million in government aid to put a major push behind cancer research. (They'd match this with a sizeable sum of their own.)

Kenneth Endicott, head of the Institute's chemotherapy program, has drawn up a set of ground-rules for industrial participation.

Thinking at the Institute is this: The chemical industry has not participated in cancer research to a greater extent because of two factors: the high cost of development and the probability that any successful program would immediately become public property. In short, so the reasoning goes, cancer research is a relatively high-risk endeavor. Consequently, the effort is what Endicott describes as "spotty".

The government subsidy plus the new set of rules are aimed at encouraging a bigger effort by industry. The amount of good will created by any firm making a real contribution to a successful cancer cure would, of course, be incalculable.

•

Amoco Chemicals has chosen a site for its xylene-oxidation plant: a 400-acre tract about four miles southwest of Joliet, Ill., on the Des Plaines river. The plant, which the Indiana Standard chemical subsidiary expects to be operating next year, will employ the Scientific Design liquid-phase air oxidation (*CW, Technology Newsletter, March 9*) to make phthalic anhydride, isophthalic and terephthalic acids (and their dimethyl esters) and benzoic acid.

•

Utilizing nuclear energy to generate electricity was one of the subjects before the Institute of Radio Engineers meeting in New York last week. Engineers of the Air Force's Rome Air Development Center described a "practical source of electrical energy that employs the heat from the decay of radioactive isotopes to drive a semiconductor or thermopile." The thermopile is a device, related to the transistor, that produces electric energy when heated.

•

A method of separating foreign particles from lamp black suspensions carried in an air stream has been developed in the research labs of General Electric Ltd. in England. A special screen filters the particles out and a system of air jets keeps the screen from clogging up.

Prototypes of the unit have been in operation for a year. The firm is now trying the same process on other industrial systems in which grit must be separated from fine particles.

•

Union Oil is going to dedicate its oil-shale plant in Grand Junction, Colo., on May 18. The $5-million plant represents the major portion of Union's total effort ($8 million) toward exploiting the tremendous reserves of shale in that area. The company expects to wind up its research efforts on oil shale this year and foresees commercial production in 1960. Eventually, it expects to make 40,000 bbls./day.

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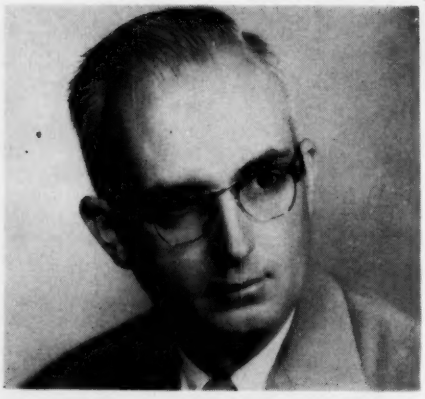
WOMER: He saves 12% for Sterling Winthrop since suppliers carry his inventory.

WEIGEL: His supplier ships specially granulated materials, cuts Eli Lilly's costs.



STILES: He pares Chemstrand's drafting costs by using equipment vendor's drawings.

Buyer's Choice: Service with a Payoff

To almost every chemical salesman, it's routine to leave customers with the promise: "If there's anything we can do to be of help, just let us know." Advertisements, too, routinely stress the variety of technical services that suppliers make available. In the marketing strategy of almost all chemical suppliers, service is a cornerstone. Yet, paradoxically, chemical buyers will accept only a very small percentage of the services offered.

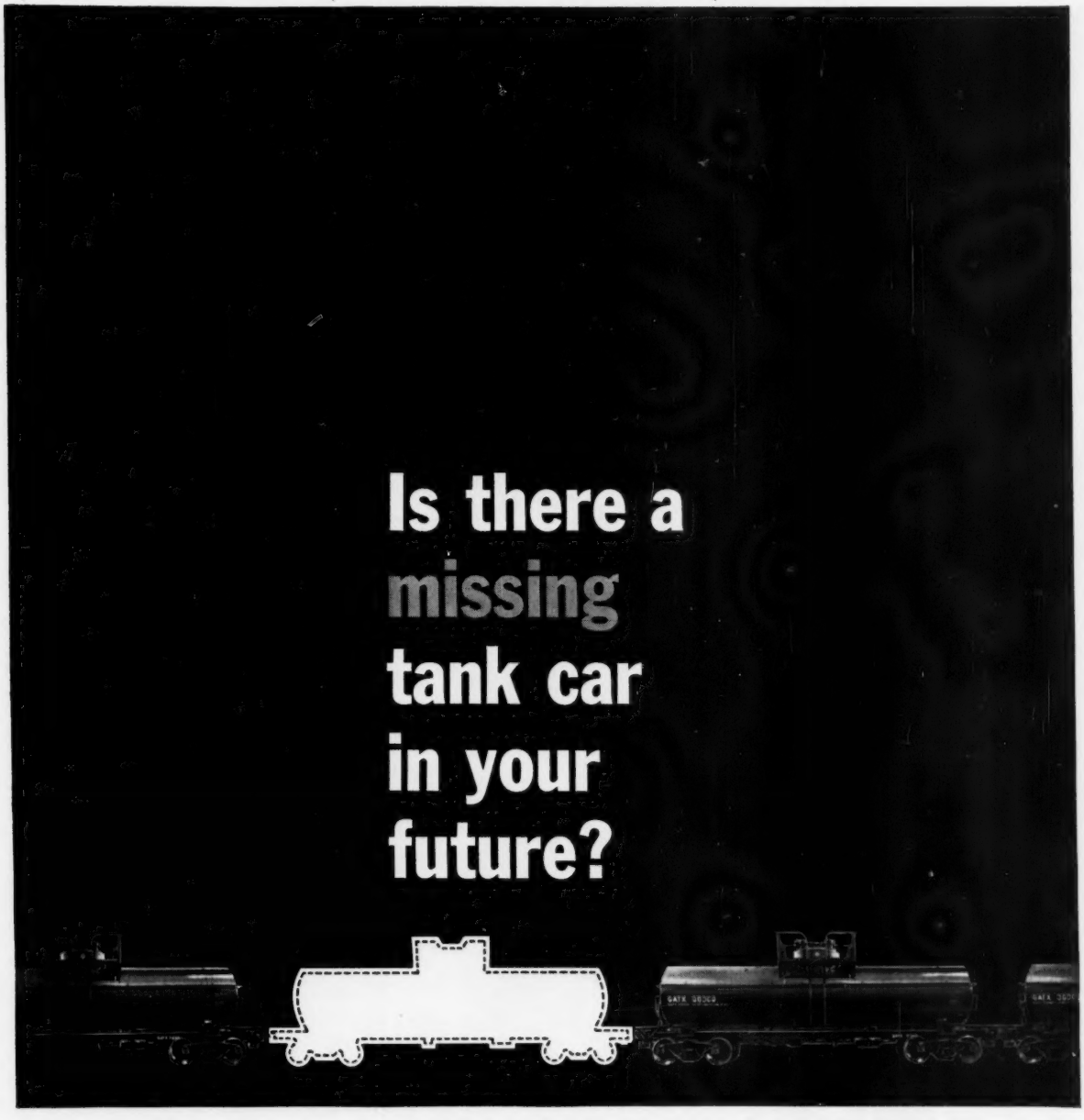
That doesn't mean that purchasing agents are trending away from using vendor services. In fact, a recent meeting of the chemical and allied buyers group of the National Assn. of Purchasing Agents underscored the value that customers place on supplier aid. What type of service puts a contract in a salesman's briefcase? Naturally, it varies with the individual account, but these recent experiences related by purchasing agents indicate that the most readily acceptable service is highly specific or tailored to the individual company, one that represents a substantial saving or process improvement.

And "big-payoff" service is not necessarily technical. Supplier assistance on problems involving transportation, warehousing, testing, market research, packaging and product granulation can all lead to signed sales contracts. Take these recent examples:

Transportation: International Minerals and Chemicals formerly barged sulfur from Louisiana and Texas to Florida. But now, a supplier does the shipping, stockpiles it for IMC in Florida. Result: the company will save $22,000 this year in barge and rail leasing, marine insurance, shrinkage and other factors, as well as be able to reduce by 50% the sulfur stockpile at plant site. By trucking sulfur from storage site to plant, IMC can use the return truck trip to haul finished phosphate to shipment point at less than rail cost.

In another instance, reports C. F. Teeple, IMC's assistant general purchasing agent, a vendor's engineer found a way to ship activated carbon in bulk, save IMC some $10,000 per year.

Warehousing: Use of supplier warehousing by the Sterling Winthrop Research Institute is producing a 12% "purchasing saving". This saving, reports SWRI buyer Clyde Womer, stems from lower annual costs in car-



That's almost certain to be the plight of companies who don't plan for their tank car requirements in the decade ahead. It's no secret that available general-purpose tank cars are going to be limited. With normal obsolescence of today's facilities, the continuing steel shortage, and with forecasts pointing to a more than 50% expansion in our economy, *liquid product shipments may be difficult . . . may miss tomorrow's sales opportunities.*

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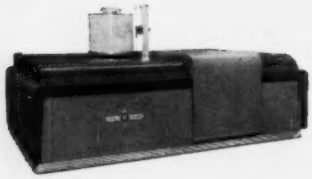
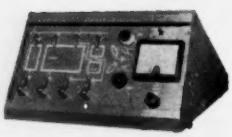
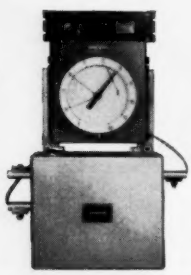


TABLE-TOP DUAL BEAM INFRARED RECORDING SPECTROPHOTOMETER

MODEL 4-55 DUAL BEAM INFRARED RECORDING SPECTROPHOTOMETER



LAB GAS ANALYZER



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rying inventory, obsolescence factors, interest on capital investment, taxes, insurance and storage facilities for factory and laboratory supplies.

Such warehousing allows materials to be bought more frequently and in smaller quantities (but in amounts large enough to get quantity discounts). The disadvantage of more frequent ordering and increased clerical work is more than offset by supplier willingness to schedule deliveries on a daily, weekly or bi-weekly basis.

Besides boosting sales, the supplier also gains a steady, assured market. Womer believes that in the ideal situation, the supplier's warehouse should be within 10-15 miles of the customer's operations.

Granulation: At Eli Lilly, a hard crystalline vitamin ingredient was abrading and scoring the sealing edges of dies used in encapsulating equipment, even though the finest commercially available mesh of the material was being used. A vendor's technical service department went to work, came up with a special, ultra-fine mesh. For Robert Weigel, Lilly's manager of drug and chemical purchases, this service meant annual savings to his firm of $25,000-$50,000 and the elimination of potential dissatisfaction among its customers.

Testing: Chemstrand's purchasing and traffic director, Norman Stiles, can cite the case of a packaging development group that was about to order costly test equipment. An alert salesman for a container supplier volunteered the use of his firm's testing facilities instead. The supplier even offered to let its customer's personnel operate the test equipment. Naturally, the salesman got additional business.

Drafting expenses, too, can be whittled by vendor service. Stiles suggests submitting only general specifications and sketches to equipment suppliers. Most are willing to prepare detailed drawings for shop use and approval.

Market intelligence: Monsanto was considering the substitution of a relatively inexpensive alcohol for a more expensive natural product used in the synthesis of one of its major products. Suppliers of the alcohol furnished data which showed that though Monsanto's potential requirements would account for 20-30% of the item's total market, current supplier capacity was adequate. From further data furnished by prospective suppliers, and from exist-

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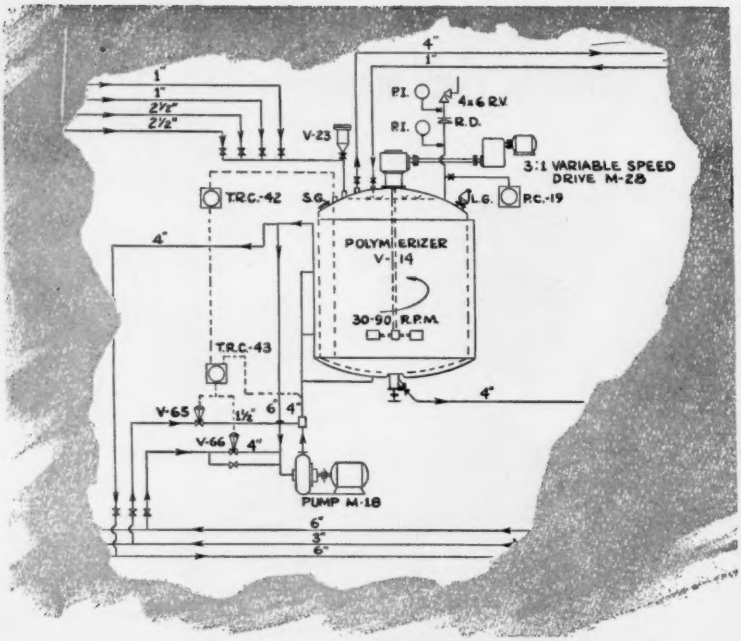

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SALES

ing literature, Monsanto was able to figure the cost of production. The information, as purchasing agent Allan Frankel put it, "proved of considerable assistance" in Monsanto's decision to switch its process, thus sparking negotiation for a million-pound alcohol sales contract at an "equitable" price.

Particulary valuable, holds Frankel, is information that gives names, locations and capacities of present and potential suppliers, size of market and uses for raw material, production costs, new and potential developments in the product's technology and estimations of future price trends for the material.

Packaging and shipping: Recent service developments in packaging give purchasing agents many important savings. Eastman Kodak's Distillation Products Industries Division is making effective use of "unitized" packaging supplied by its vendors. Stacking and gluing of loaded multiwall bags on a disposable cardboard pallet is sufficiently inexpensive to avoid a special service charge. Such unitizing permits fork truck handling and compact, easy storage.

"Batch" packaging is another service highly appreciated by DPI's purchasing agent, K. S. French. DPI buys (and sells) vitamin A, for example, in a container that holds the precise amount needed to fortify one batch of a margarine customer's product. Storage of partially used packages and weighing are eliminated.

DPI also cashes in on reusable shipping containers. Some vendors are willing to ship raw materials in drums painted and labeled to DPI's specifications. After processing, the drums become the shipping containers DPI uses for some products. The practice, observes French, eliminates "one more item to be purchased, checked and stored." Inventory of drums and products remains in balance, and the cost to the vendor is negligible—since packaging must be provided for the product anyway.

Supplier services are as valuable, as sales tools, as they have ever been. But routine offering of service isn't the equivalent of having it used. If the chemical buyers' experiences can serve as a guide, the service that is oriented to a specific problem, that offers worthwhile savings or a method improvement, is the kind that gives a welcome fillip to sales curves.

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DIMETHYLAMINE

METHANOL

AMMONIA

FORMALDEHYDE

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HYDROXYLAMMONIUM CHLORIDE

TRIMETHYLAMINE

HYDROXYLAMMONIUM SULFATE

ETHYL ACETATE

DIBUTYL PHTHALATE

NITROMETHANE

BUTYL LACTATE

AMYL ACETATE

BUTYL ACETATE

BUTANOL

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METHYLAMINES

HYDROXYLAMMONIUM ACID SULFATE

PENTAERYTHRITOL

TRIBUTYL PHOSPHATE

MONOMETHYLAMINE

1–NITROPROPANE

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BUTYL STEARATE

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INDUSTRIAL CHEMICALS

Sulfuric: Capacity Leads Growing Needs

Sulfuric acid supply is posing no serious problem to consumers at the moment—a complete reversal of conditions a short three or four years ago.

And when planned or facilities under construction come onstream, there's an outside chance that before the year is out, total sulfuric availability in some areas will reach levels high enough to furrow producers' brows. Although demand is definitely on the upswing, increases in U.S. productive capacity are more than a step ahead of consumption.

Among the new and expanded plants that will push domestic capacity up this year to about 21 million tons/year (compared with '56's estimated 19.6 million tons) are these:

- General Chemical Division (Allied Chemical & Dye) expects to have its new sulfuric acid plant in Elizabeth, N. J., onstream this May. Estimated capacity: 220,000 tons/year.
- Best Fertilizer Co. of California will start producing at a new plant this year. Capacity: 75,000 tons/year.
- Du Pont is just about due to come in with a plant in Cincinnati, O.; capacity here: 200,000 tons/year. The company has also announced a new installation for the Detroit area, the sixth new unit in the company's post-World War II modernization program of sulfuric production facilities.
- Kennecott Copper will have a 36,000 tons/year plant in Hayden, Ariz., operating this year.
- Stauffer Chemical is expanding its present capacity at Vernon, Calif. Total capacity there, including the addition: 150,000 tons/year.

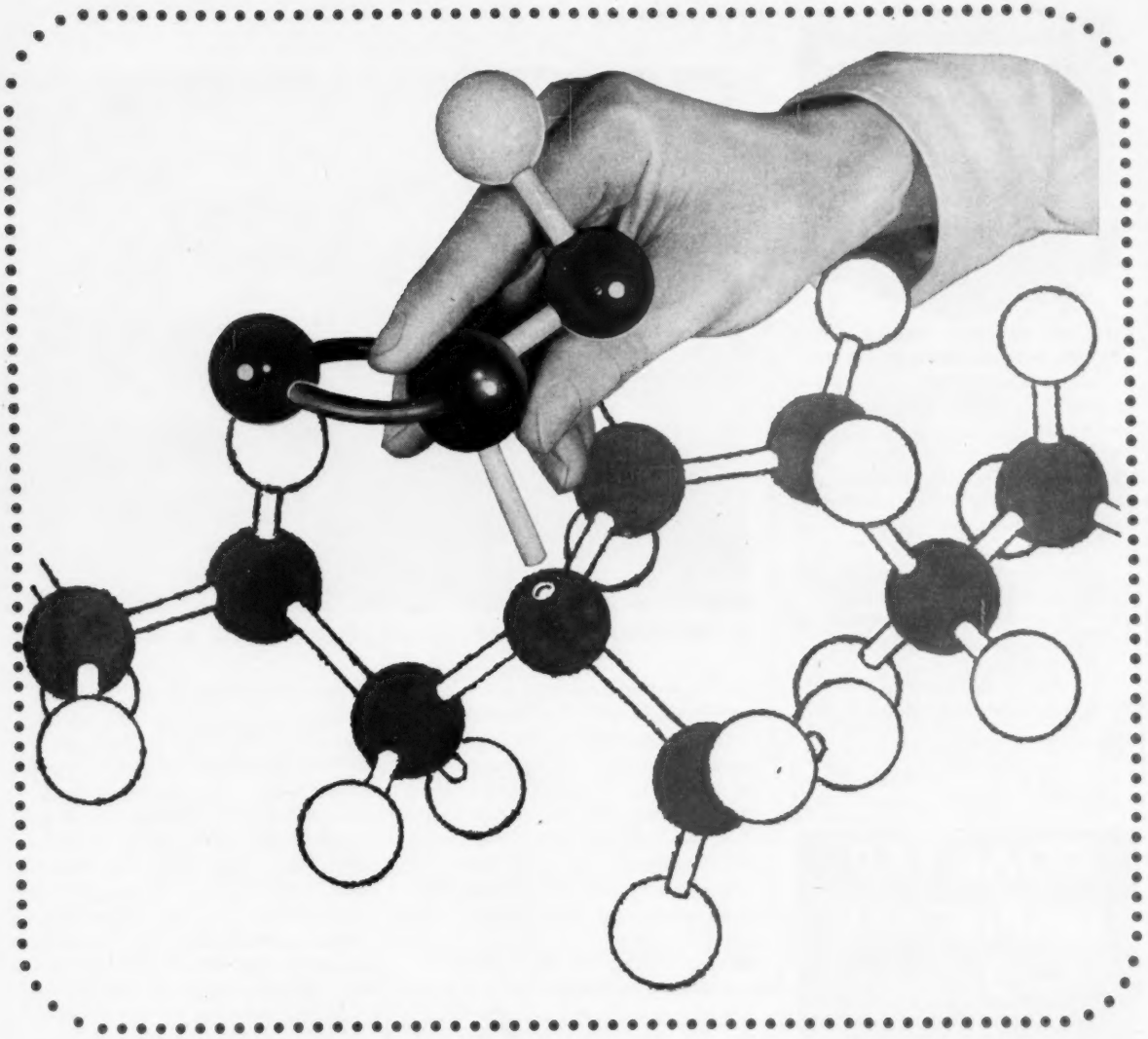
How Much is Used: There is some disagreement on the exact gross amount of sulfuric consumed last year —figures hover near 17 million tons— but market followers opine that demand should continue upward because of stepped-up activity in various industries dependent on sulfuric.

A glance at the number of outlets that use the acid (*table*) is enough to see why consumption of sulfuric is considered, by economists, an important gauge of industrial prosperity.

Outlets On Top: Fertilizers, despite the poor agricultural year, still remain

Outlet	1952* (thousand short tons)	1956** (thousand short tons)
Phosphatic fertilizers	4,053	4,300
Petroleum products (total)	1,888	2,220
aviation gasoline	1,181	1,250
catalysts	155	220
sulfonates (lube oil additives)	150	180
others (except sulfonated hydrocarbons)	482	570
Ammonium sulfate total	1,228	1,570
synthetic	608	850
coke oven	628	720
Inorganic pigments	1,250	1,500
Chemicals not elsewhere classified	1,245	1,300
Iron and steel	838	1,100
Alcohols	650	725
Rayon, total	529	560
high tenacity yarn	274	290
other	255	270
Aluminum sulfate, total	365	465
water and sewage treatment	85	125
other	275	340
Nonferrous metallurgy	218	450
Industrial explosives	375	425
Synthetic detergents	225	300
Hydrofluoric acid	135	260
Regenerated cellulose sheet film (chiefly cellophane)	105	170
Dyes	150	150
Insecticides	130	140
Rubber, including synthetic	110	130
Hydrochloric acid	128	110
Chromium chemicals	60	80
Light oil refining	64	75
Storage batteries	60	75
Tall oil	39	70
Chlorine drying	40	65
Industrial water treatment	30	60
Medicinals	33	40
Textile finishing	30	30
Copper sulfate	27	25
Fat splitting	15	17
Sulfonated oil	5	10
Miscellaneous	459	590

*BDSA survey **CW estimate



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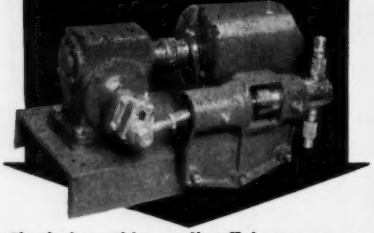

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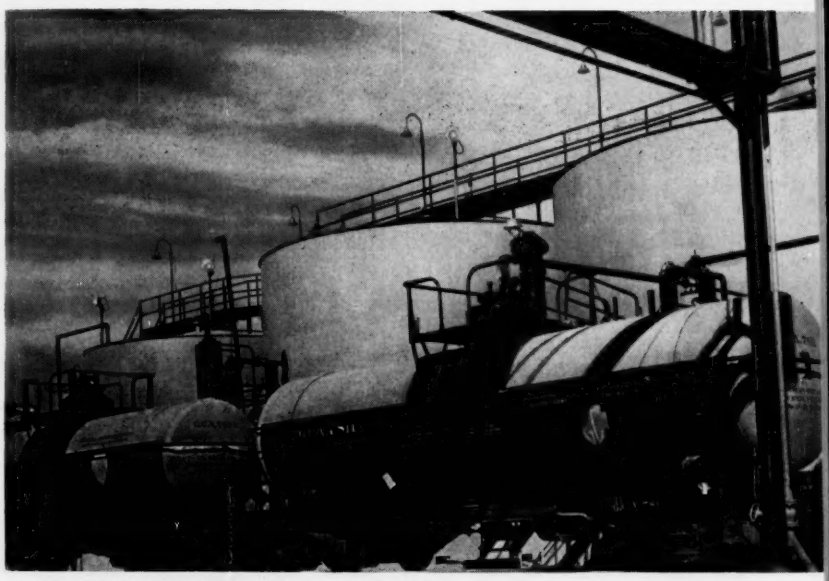

SULFURIC'S READY to roll at Allied's 200,000 tons/year Baton Rouge plant

the biggest sulfuric acid users. Combined consumption for fertilizers (including phosphatic materials and ammonium sulfate) was 5.9 million tons of sulfuric in '56, as compared to 5.3 million tons in '52. This rate of growth over the four-year span is not considered significant, especially since '52 was a poor year for ammonium sulfate production. And with various technological changes in fertilizer manufacture, sulfuric use may drop.

Petroleum needs rank second in the line of important sulfuric acid siphoners. The biggest growth of acid consumption has been in the catalytic phases, for cracking and for use in alkylation. In this branch of the petroleum industry alone, sulfuric usage jumped over 40% since '52, and the healthy growth is expected to continue.

In comparing '56 acid consumption figures to those in '52, rayon, and iron and steel production (both important outlets for the acid), appear to have done moderately well. During '52, however, the steel industry suffered a crippling strike, while the rayon industry suffered a serious setback. Thus, here again, an apparent increase in sulfuric consumption is not a completely accurate picture of its market growth.

Faster on Film: Cellophane production is perhaps more typical as an area where sulfuric consumption is decidedly on the uptrend. It's difficult to pinpoint accurate cellophane output because of the lack of official statistics, but some studied estimates do indicate a sizable growth pattern. As recently as '53 cellophane production hit close to 300 million lbs./year, and expansions during the following year or so lifted the industry's capacity to nearly 350 million. With plant refinements and improvements in production methods, in addition to the new plants, a good estimate for U.S. cellophane production, within the next half decade, would be close to 500 million lbs./year *(CW, June 30, '56, p. 90)*.

Latest cellophane expansion word comes from major producer Du Pont; it's planning a 50-million lbs./year plant near Topeka, Kans., with construction slated to begin shortly.

More for Metals: There's been a step up in consumption of sulfuric by the non-ferrous metallurgical field; use has jumped 100% over the last four years. Chief reason: uranium milling has become increasingly important in the overall picture. Recent milling process development has led to more efficient methods that allow an increase uranium recovery—over 90% of ore values. More uranium milling plants using sulfuric are going into operation and older units are being switched to recoveries using sulfuric. Spokesmen for the industry are certain that as a result usage of sulfuric in uranium processing will, in the near future, become one of the largest outlets for the chemical.

Detergent Decline? Synthetic detergents, of course, have had a phenomenal growth over the past few years. And this growth is reflected in sulfuric acid consumed in their production—over 33% since 1952. This percentage growth is impressive, but consensus in the trade is that syndet sulfuric consumption will soon level off. The increase won't be as brisk as it has been.

Booming Market: The industrial explosive market presents another challenge to sulfuric producers. Following a slight slump during '53 and '54, the explosive industry is now getting a welcome "shot in the arm" from the current high rate of activity in highway construction and coal mining—barometers for the explosives market. Since sulfuric plays an important chemical role in the production of heavy type explosives, the upsurge in the industry will directly affect amounts of acid consumed.

Meanwhile, production of hydrochloric acid, via the salt and acid method, is steadily declining and will likely continue to do so. As the amount of sulfuric used in this process peters out, it means more sulfuric available. The booming hydrofluoric market over the past few years however, more than makes up for the setback in hydrochloric usage.

Since '52, the hydrofluoric acid industry more than doubled its annual consumption of sulfuric. Reason: hydrofluoric is becoming an increasingly important chemical building block for such uses as fluorinated hydrocarbons (refrigerants and propellants), fluocarbon plastics, uranium processing, and in making high-octane fuels. It takes sulfuric to make hydrofluoric, a boost in consumption of one means a concomitant increase for the other.

Sulfuric demand since '52 has kept pace with its U.S. capacity mainly because the significant declines in usage in some major outlets (e.g. fertilizers), has been offset by increased demands of other industries (petroleum, uranium, inorganic pigments).

Whether or not sulfuric's consumption-production scale will be similarly balanced in the near future is debatable, of course. But while the additional tonnages of acid capacity due in soon are causing concern to a few producers, the industry by-and-large is certain that future demand will warrant the current round of expansions.

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What is Questex?

QUESTEX is the Maas-Victor trade name for a group of poly-amino-acid-based organic sequestering agents which complex or chelate multivalent, metallic cations into outstandingly-stable, coordinated anionic complexes.

Suggestions for Evaluation:

As a source of agricultural trace metals—stabilizer for cellulose and synthetic fibers—to inhibit trace metal degradation and discoloration—in metal cleaning and electro-polishing—color and other photographic processing—for decontamination of nuclear materials—radiator and steam cleaning ingredient—stabilization of hydrazine—heat stable water and brine treatments—to boost detergent activity.

Write for other suggested uses and more detailed information.

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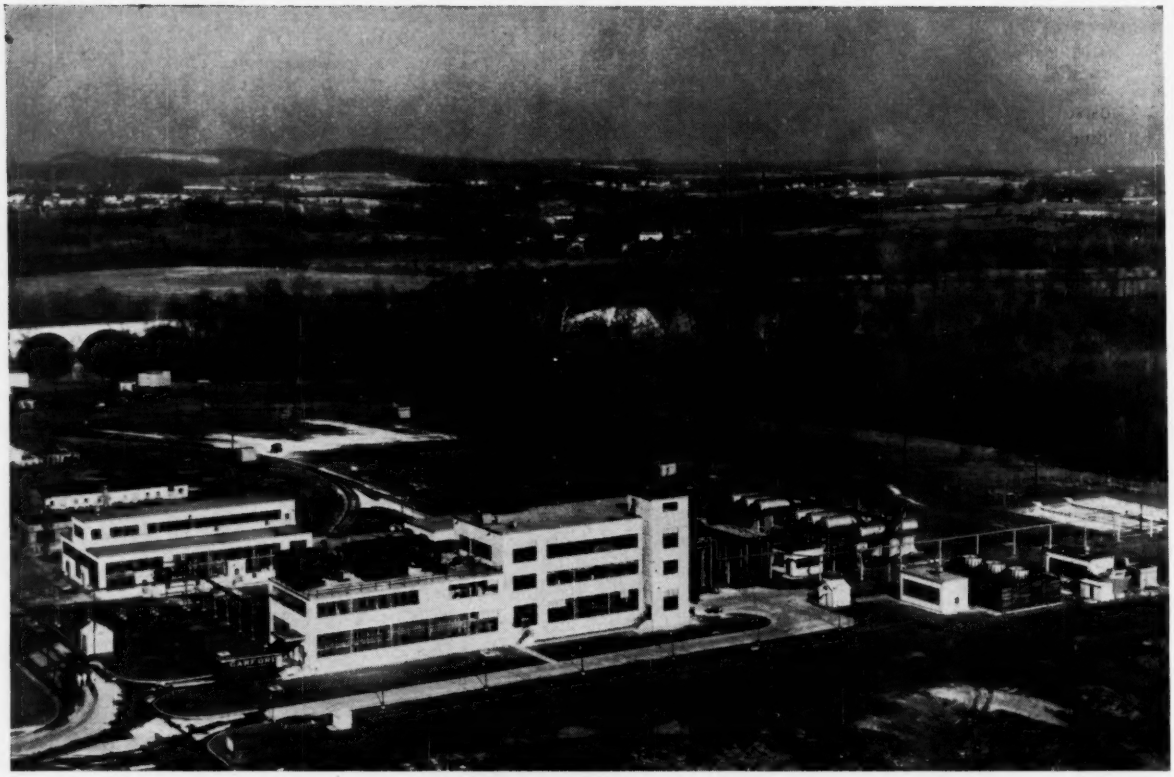
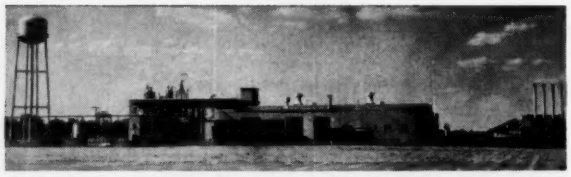
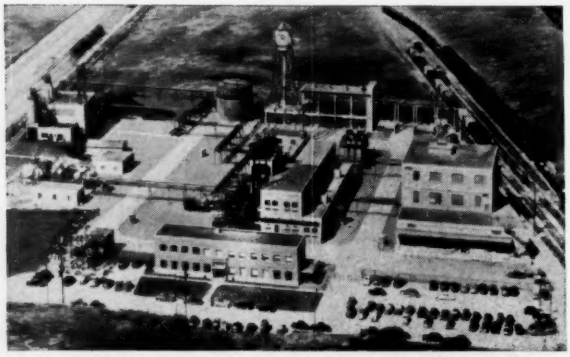
Division of Victor Chemical Works
4570 Ardine Street, South Gate, California



Polyvinyl chloride resin plant of Firestone Tire & Rubber Co., designed and constructed by Blaw-Knox engineers



Polyvinyl acetate plant designed and built by Blaw-Knox for National Starch Products Inc.—later doubled in capacity by Blaw-Knox



Vinyl chloride monomer and polymer plant built for Glenn L. Martin Company and subsequently expanded for U. S. Rubber Company

Blaw-Knox has been building vinyl resin plants for over 10 years

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Market Newsletter

CHEMICAL WEEK
March 30, 1957

Is the over-all chemical price index ready to plateau? Some market observers profess to see signs that indicate a "yes" answer. That may be so. But chances are the leveling won't be clearly apparent until later in the year. The index, incidentally, has been inching upward since last fall (*see Charting Business, p. 26*).

•

More chemical buyers are being handed higher price lists almost daily. This week, for instance, crude glycerine consumers are paying an additional 1¢/lb. for their needs. It's a reversal of the price trend of a few months ago *(Market Newsletter, Oct. 13, '56)*, when domestic soap-lye and saponification-grade tags were pressured downward by imported crude prices.

That the market has firmed-up somewhat may be one factor behind these currently higher quotes: soap-lye material, 16¢/lb.; saponification-grade, 17.6¢/lb.

•

A pick-up in movement of fertilizer materials is being registered in many sections of the country, especially in the South. The acceleration is seasonal, though, and a few producers and dealers are frankly admitting that they look for "no banner year in sales."

Part of the market improvement, too, may be attributed to consumers' upping purchases to beat the date—April 1—on which some fertilizer-material prices will advance.

Increases on solid urea products, amounting to $5/ton on both agricultural and industrial grades, were effected by a couple of makers earlier this month, and others are emulating the move; it's certain that higher urea prices will be industry-wide.

•

Normal superphosphate tags are also slated to go up next week. But according to the one major producer who has thus far posted the 40¢/ton increase, April 1 will be the effective date for spot sales only. Contract customers will be offered the old price of 88¢/unit of available phosphoric acid until June 30.

It was no surprise to the industry that normal superphosphate production and shipments last year were down from the '55 level, but latest government statistics indicate the drop-off wasn't too drastic. Output was off only 4%, sales about 2%.

The data, in short tons (100% a.p.a.):

1956		1955	
Production	Shipments	Production	Shipments
1,493,013	819,054	1,557,073	837,056

Low-pressure polyethylene is hitting the market in large-scale commercial lots. Phillips Chemical released word last week that tonnage quantities of its rigid-type material (Marlex 50) are starting to move to fabricators throughout the country.

The company's plant at Houston, Tex., isn't ready for peak production yet, but capability is scheduled to reach some 75 million lbs./year during the latter half of '57, as additional equipment is placed in operation.

Phillips' output and that of Celanese's plant, also at Houston, is focusing attention again on just how big low-pressure "poly" will be, compared with "conventional" high-pressure material. An earlier *CW* estimate pegs the outlook like this: about 380 million lbs./year of low-pressure capacity onstream by late '57 or early '58; 850-900 million lbs./year high-pressure capacity in place by mid-'58.

It's a whopping amount of polyethylene, and as one marketer not so facetiously tells *CW*: "All we gotta do is sell it."

•

The spread in petroleum toluene prices has been eliminated. Late last week Esso Standard Oil rescinded the 1½¢ gal. increase it posted earlier (*CW Market Newsletter, Mar. 9*) at most of its principal terminal points. Why? Tersely stated: "Competitive conditions."

Spelled out it means that other producers were apparently reluctant to go along with Esso's hike because of the current easing in toluene demand. Few producers, though, will deny that an increase is justified at this time on the basis of mounting manufacturing and transportation costs.

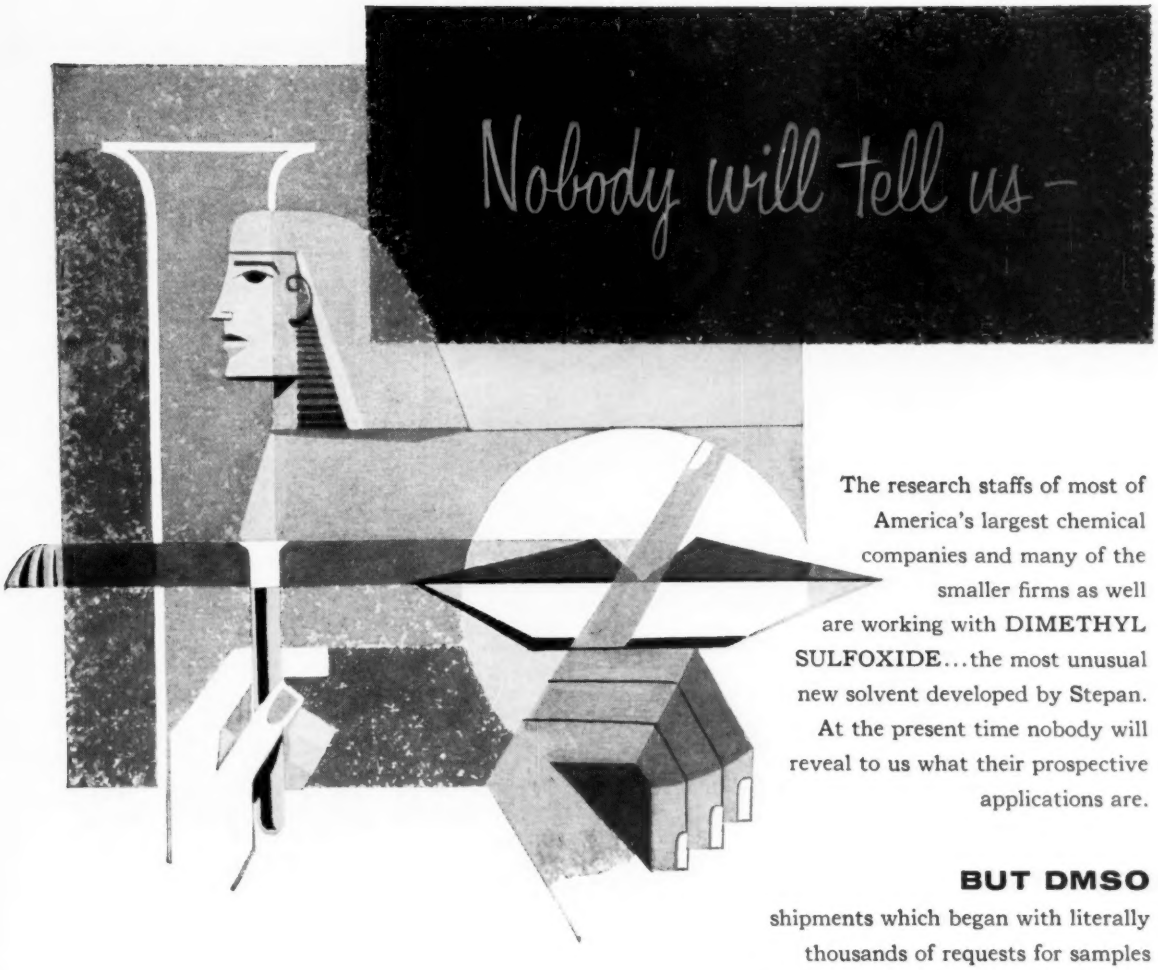
It's questionable whether or not an anticipated pick-up in toluene demand will be strong enough to overcome producers' hesitancy in raising prices, but trade talk indicates that third quarter schedules will tell the story.

SELECTED PRICE CHANGES—Week Ending March 25, 1957

DOWN

	Change	New Price
Molasses, New Orleans, blackstrap, feed grade, tanks, per gal.	$0.00125	$0.2550
Soybean oil, refd., clarified, dms.,	0.005	0.1700
Tallow, edible, tanks, dlvd.,	0.005	0.1250
Tallow, inedible, fancy, bleachable, tanks, dlvd.	0.00125	0.07625
Toluol, petroleum, indust., 2-degree, tanks, wks., Bayonne, N. J., per gal.	0.0150	0.3400

All prices per pound unless quantity is stated.



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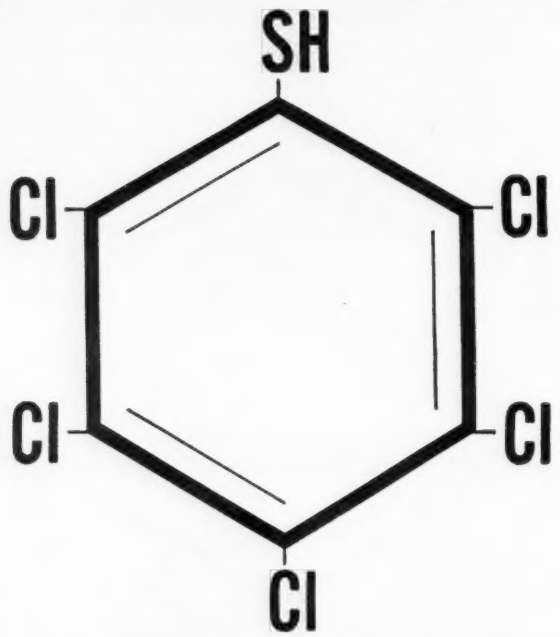

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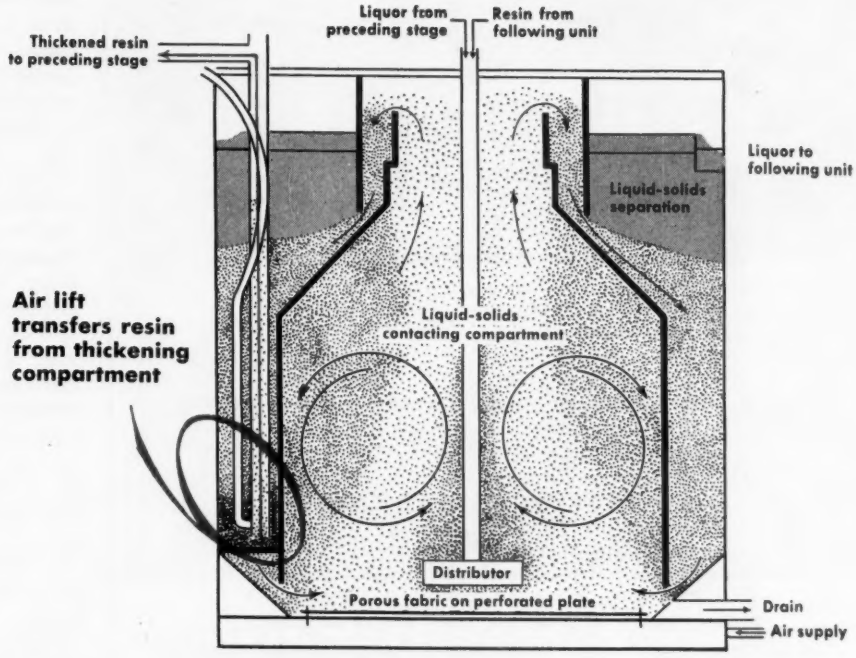
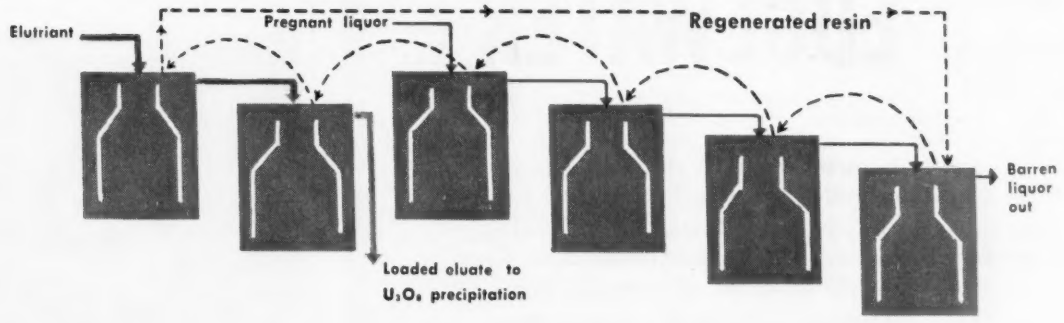
ORGANIC CHEMICALS DEPARTMENT

Resin rides an air-lift . . .



. . . for continuous RIP extraction

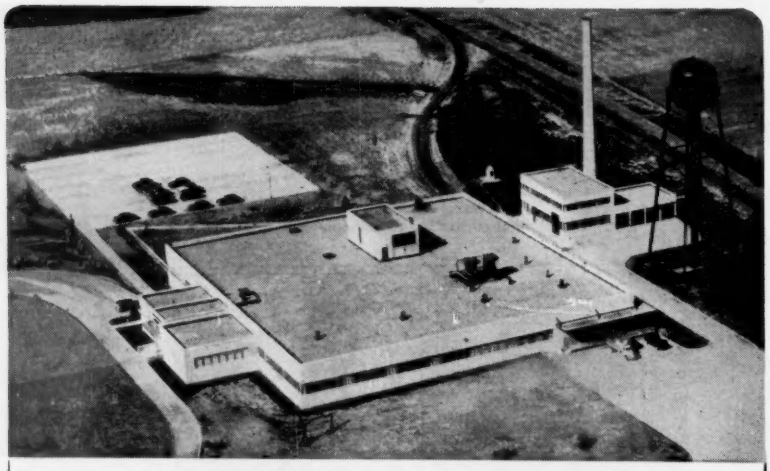


Ion Extraction Tries New Tack

Ion exchange and solvent extraction, which have been neck-and-neck contenders in the race to develop an economic process of recovering commercial quantities of uranium from ore, are counting on new and improved processing techniques to make it a race right down to the wire.

Betting on ion exchange is the Infilco-Techmanix combine, whose system (*above*) air-lifts resin between successive stages to permit continuous, countercurrent extraction of resin-in-pulp slurries, as well as of clear liquors. Latest to put its money on solvent extraction: Arthur D. Little, whose "solid solvent" extraction sidesteps foaming and entrainment problems.

Proving ground for the method devised by Techmanix Corp. (Salt Lake City) is a 2-tons/day pilot plant at Tucson, Ariz. This plant, in four months of pilot operations, has completed 12 separate runs with low-grade (0.183% U_3O_8) ore from the Mi Vida



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William E. Joseph,
Works Manager
Barrett Division
Allied Chemical & Dye
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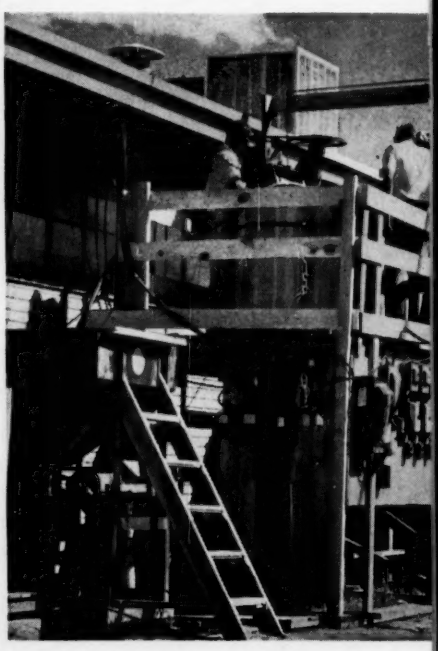
Mine (near Moab, Utah).

Treatment of the ore at the Tucson pilot plant begins with conventional milling and leaching operations in outdoor ore-handling units. Ore is crushed by jaw and gyratory crushers, then conveyed by belt to a ball mill in closed circuit with a screw classifier. From the grinding section, the ore is fed by a sand pump to the leaching section where it is leached with sulfuric acid in four wooden tanks equipped with rubber-covered, flotation-type impellers. After separation from sands, the uranium-rich pulp is pumped to a larger agitated batch make-up tank that feeds the novel extraction system.

Resin Air-lift: Inside the plant, uranium is stripped from the pregnant feed liquor by an anion exchange resin (IRA-400 was used in the pilot tests) passing countercurrent to the liquor in a moving bed. Key components of the system: six 30-in. Aero-Accelators (four for extraction, two for elution) designed by Infilco, Inc. (Tucson, Ariz.) to accomplish the air-lift transfer of the resin. Here's how the system works:

Regenerated resin is fed to the final extraction unit and is mixed by air agitation with low-uranium-content slurry entering by gravity from the preceding stage. Air agitation, says Infilco, insures liquid-solids contact-



OUTDOOR MILL: It pulps uranium ore

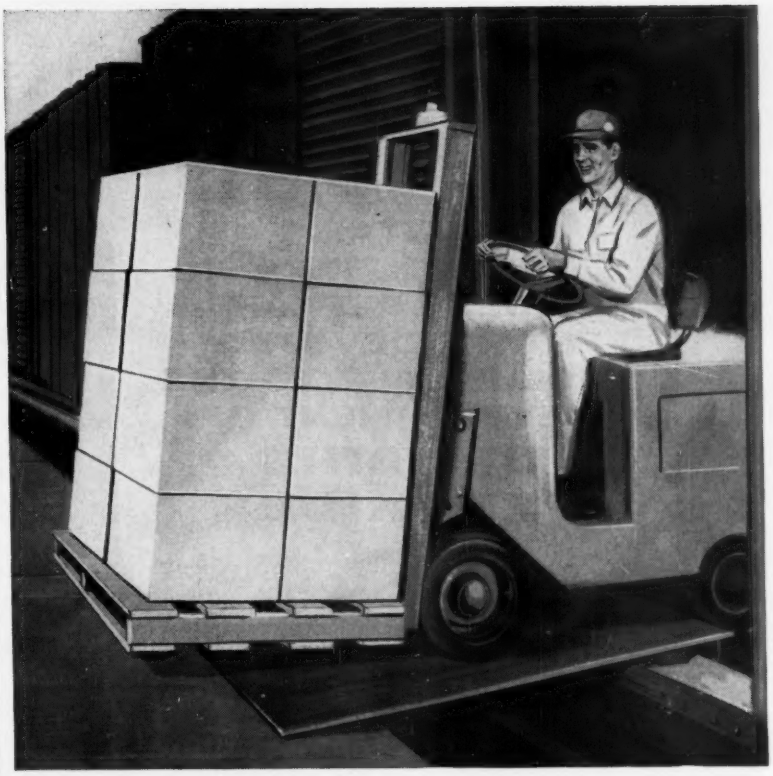
ing, minimizes attrition of resin beads. After thorough mixing in the contacting zone, materials overflow into an annular separation zone, from which the liquor may be withdrawn by gravity flow.

Solids settling to the bottom of the separation zone are recycled to the contacting zone or, in the case of resin to be transferred to the next preceding stage, dewatered by settling in a separate hopper-like compartment. Compressed air, entering at the bottom of the hopper, lifts the lightly loaded resin, carries it up out of the hopper and back into the preceding extraction unit.

The contact-transfer cycle is repeated continuously to carry the resin through all four extraction units, two stages of elution. Loaded eluate from the latter is collected for final recovery of uranium by precipitation with magnesium oxide. Stripped elutriant is then recycled to the resin regeneration units.

Soluble extraction of uranium by this system was good, says Infilco, and operating difficulties, small. What's more, the company adds, loading of the 20-50 mesh resin used in the tests was good enough to indicate that practically any standard resin can be used. This characteristic extends the potential applications of the system not only

oor extraction at Infilco-Techmanix.



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to many other hydrometallurigcal processes, but also to such fields as sugar-processing and biochemical operations. Added advantages, according to Infilco: low capital cost, elimination of mechanical moving parts, adaptability to continuous treatment of slurries at higher solids content than can be handled by basket resin-in-pulp techniques.

Solid Solvent: Arthur D. Little's approach to solvent extraction of uranium is aimed at eliminating the troublesome foaming and costly solvent entrainment losses that, to date, have been the chief deterrents to extraction with liquid organic carriers. To avoid these process snags, ADL devised a "solid solvent" consisting of a selective chelating agent adsorbed on abrasion-resistant activated char.

Except for physical considerations in the handling of the char, the ADL process operates in much the same way as liquid solvent extraction. Relatively coarse particles (between minus 10 and plus 20 mesh) of the chelated char are mixed with ore pulp (or solution) in simple agitator tanks. Loaded char is then recovered from the stripped liquor by simple screening. For continuous countercurrent operation, the char may be transferred from one agitator stage to the next by a vibrating screen conveyor.

When the chelated char reaches equilibrium loading, it's stripped of uranium by leaching with a small amount of solvent—sodium carbonate in the case of OPPA (di-2-ethylhexyl pyrophosphoric acid). The char is then recycled to the first extraction stage, with added flushing and/or chelate readsorption steps if necessary.

Pro and Con: An outstanding characteristic of the use of chelated char is its durability. Attrition—a major stumbling block in continuous resin ion exchange processes handling heavy slurries—is no problem in solid solvent extraction, says ADL. In another process, char has been used on extremely hard phonolithic ores for more than four years with little loss by attrition. However, the activity of the chelating agent degenerates in time, necessitating occasional readsorption of fresh material to replace that lost through deterioration.

Another possible drawback to the use of chelated char is its tendency to be poisoned by preferentially adsorbed cations. For example, dissolved silica may be deposited on the char during

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PRODUCTION

acid leaching of uranium ores. When this happens, a separate step must be added to the process: removal of silica can be accomplished by flushing with dilute caustic or hot sodium carbonate.

By proper selection of the chelating agent, says ADL, the process can be used for selective recovery of copper, nickel, cadmium, titanium and zirconium as well as for uranium extraction. The chelating agent (OPPA for uranium, 8-quinolinol for copper and titanium, for example) may be adsorbed onto the char from either a water emulsion or solvent solution.

Smoothing Old Routes: Though the newer recovery techniques are attracting much attention, processors haven't given up hope of adapting older extraction processes to the treatment of high-solids uranium slurries.

The Bureau of Mines' Intermountain Experiment Station (Salt Lake City) has developed a liquid solvent extraction process that, it says, is suitable for use with pulps containing less than 5% solids. To adapt the process to slurries with 40-60% solids, it is now experimenting with new contacting procedures designed to minimize solvent entrainment losses. The trick: adding the slurry to the solvent, rather than vice versa, so that the settled slurry re-coalesces without entraining excessive amounts of solvent.

Dow Chemical, meanwhile, has been attacking the entrainment problem by adding surface active agents to minimize solvent loss. To date, the most promising additives appear to be lignin sulfonates, such as Crown-Zellerbach's Orzan, Marathon's Marasperse. Dow is currently test-marketing Dowsol 12 (a monoalkyl phosphate)—first of a new line of solvents for hydrometallurgical processing. Next step: pilot plant operation with Dow's additives in USBM's mixer-settler.

Room for All: During the past eight years, improvements in hydrometallurgical processing have helped to cut the cost of uranium from $15 to around $8/lb. U_3O_8, thereby switching emphasis from the earlier goal of ultimate recovery to today's more realistic aim of optimum extraction. If the upcoming process developments can do as well, chances are the burgeoning nuclear industry will need all three—resin ion exchange, solid and liquid solvent extraction—to keep up with fast-growing uranium demands.

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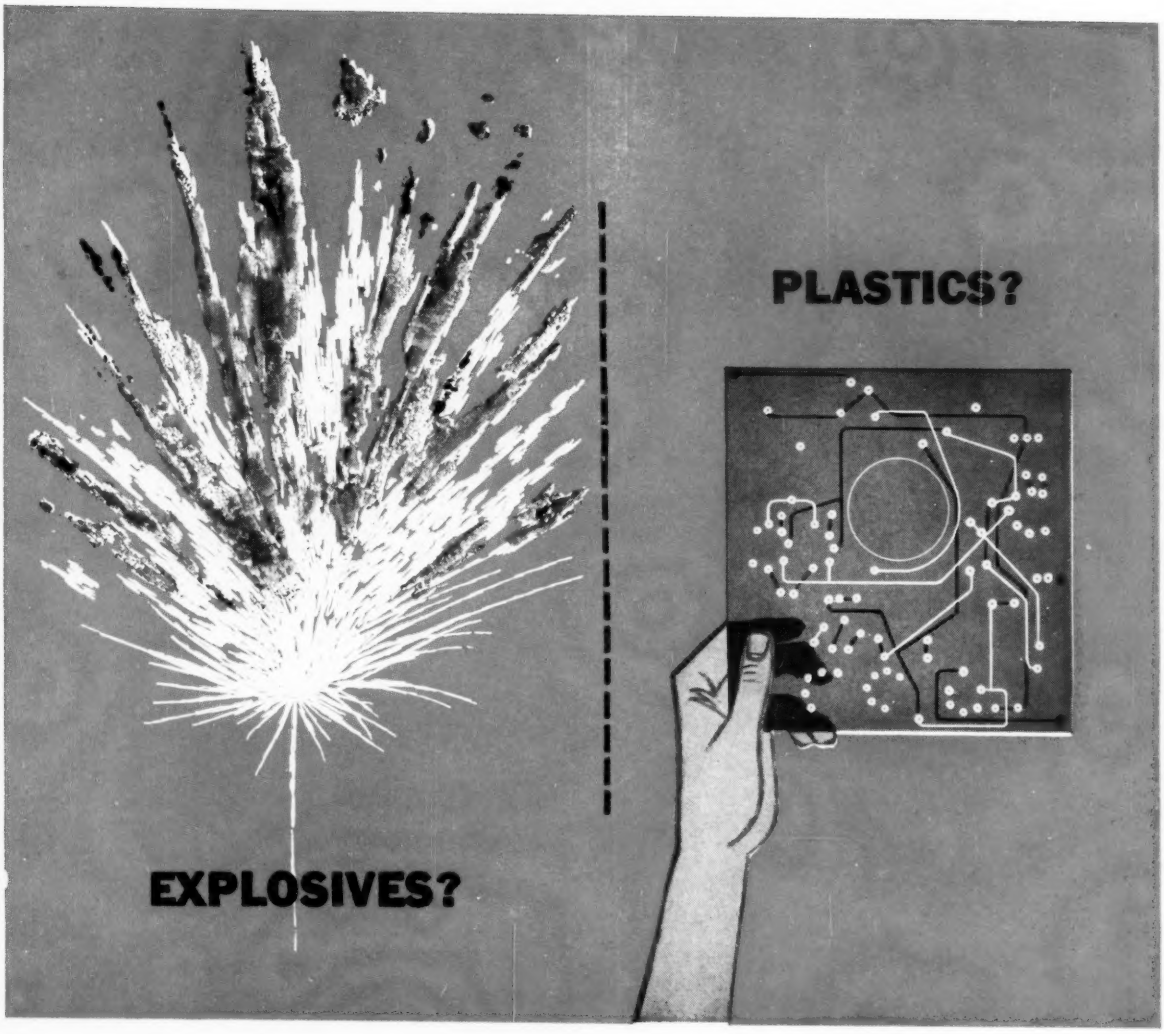

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